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SYMPOSIUM.

TUBERCULIN TESTS: THEIR SIGNIFICANCE AND VALUE.

INTRODUCTION.

ROBERT KOCH'S announcement on March 24, 1882, of his discovery of the tubercle bacillus, followed by his further investigations and pronouncements regarding tuberculin and its rôle in the diagnosis and treatment of tuberculosis, open up a new field which during the past fifty years has been diligently explored by workers in many lands. But much remains obscure both as regards the tubercle bacillus and tuberculin. In our last issue we presented a symposium on Tuberculosis Infection, giving the views and experiences of a number of tuberculosis experts. It has seemed desirable to follow this collection of opinions by a symposium dealing with Tuberculin Tests and indicating their significance and value, and this we have been able to arrange, thanks to the kind co-operation of a number of research workers and clinicians. Dr. P. D'Arcy Hart has recently issued as a publication of the Medical Research Council a valuable Report on the subject, and this should be studied by all interested in Tuberculin Tests.* The question of the position of tuberculin today in the diagnosis of tuberculosis is to be discussed on July 27 in the Tuberculosis Section of the Centenary Meeting of the British Medical Association, so it is hoped that the appearance of this symposium will not only be timely but of service.

* "The Value of Tuberculin Tests in Man, with Special Reference to the Intracutaneous Test," by P. D'Arcy Hart. Pp. 136. London: H.M. Stationery Office. 1932. Price 2s.

FROM PROFESSOR CHARLES M'NEIL,

M.A., M.D., F.R.C.P.,

Edward Clark Professor of Child Life and Health in the University of Edinburgh; Physician to the Royal Edinburgh Hospital for Sick Children.

OF the four or five tuberculin diagnostic tests, the two most generally used are the cutaneous (Pirquet) and the intracutaneous (Mantoux) tests. Of these two, it is usually said that the Mantoux is the more delicate. Recent careful comparative tests have, however, shown that the Pirquet test properly performed is at least as delicate as the Mantoux; so that for convenience, simplicity, and reliability in general medical practice the balance of advantage rests decidedly with the Pirquet test. The value of the tests in revealing the extent of tuberculous infection has been very great. Their value in the diagnosis of tuberculous disease is much more limited, and is chiefly in the tuberculous diseases of childhood. A positive reaction to the test does not add to nor corroborate the existing clinical evidence, but it makes possible a tuberculous interpretation of that evidence. A negative reaction in diseased conditions suggestive of tuberculosis excludes tuberculous disease. In children there are a good many chronic disorders of the abdomen and thorax, joints and elsewhere, where a negative tuberculin reaction is of great assistance in the diagnosis of exclusion. A positive tuberculin test, in the absence of disease, is of some significance in a child under five years. In a child under two it is more serious, owing to the greater risk of local spread or distant dissemination from the focus; but even at this dangerous age the original focus may remain localized and may become permanently healed. But such early positive reactions always call for careful supervision of the child.

FROM A. G. OGILVIE,

M.B., M.R.C.P.,

Honorary Assistant Physician, The Babies' Hospital, Newcastle-on-Tyne, and Medical Tutor, Durham University.

The most useful tuberculin test for standard use is the intradermal test of Mantoux, using a fixed dose of $\frac{1}{10}$ milligramme of Koch's old tuberculin. Statistics are now available showing the results of this test in sections of the population, and these indicate that it is of greatest value in the diagnosis of tuberculosis in infancy and childhood. Experience of the test in babies and children leads one to the view that generalizations as to its value or lack of value are apt to be misleading. Not only is it of greater help in babies than in older children, but it is more useful in some varieties of tuberculosis than it is in others. I

would suggest that the usefulness of general statistics in this regard is now passing, and that investigation of selected groups is likely to lead to a truer appreciation of the proper place of the tuberculin tests in the diagnosis of disease. The use of the test in selected groups, as far as my experience goes, shows that it is in tuberculosis of the bones and joints that results of most value are obtained. The test in these cases approaches more nearly to an absolute value than in any others. Allergy usually runs parallel with resistance, and it is in the resistant phase that affection of the bones and joints most commonly occurs. Of nearly equal value are the results in that curious variety of pulmonary infection known as epi-tuberculosis. The test is always strongly positive in this condition, and a negative result is almost incompatible with the diagnosis. In suspected cases of abdominal and glandular tuberculosis, with which is included mediastinal affection, the test is of assistance if no attempt is made to exalt it unduly over other physical signs. A positive result is of suggestive value only, in children over three, and certain unexplained negative results are obtained in proved cases. In the majority of cases, however, definite help is afforded. The question of pulmonary tuberculosis is more difficult. One may say, however, that in children under three the test is of great value, and not infrequently leads to the more careful study and diagnosis of cases which would otherwise probably be overlooked. The disease at this age is not invariably a rapidly fatal illness. In older persons we can hope for but slight assistance from tuberculin testing in these cases. Lastly, it must be borne in mind, of course, that any acute infection may suppress allergy temporarily, and that in rapidly advancing and in miliary tuberculosis the test is frequently negative.

FROM SINCLAIR REID WILSON,

M.D., D.P.H.,

Consultant Tuberculosis Officer to the West Riding of Yorkshire.

Tuberculin tests signify a sensitivity to tuberculin which varies (*a*) in degree, (*b*) according to quantity and strength of tuberculin employed, (*c*) in rate of development of reaction, and (*d*) in the time for the persistence of the reaction. Because of this variability, and because tuberculin tests are both quantitative as well as qualitative, there is found to be a fair proportion of tests neither definitely positive nor definitely negative, but, rather, $\pm$ or $\mp$ according to their tendency one way or the other. A positive test is no indication of the presence of active tuberculosis; otherwise at least 75 per cent. of adults would be suffering from the disease itself. A negative test (*a*) in infancy, where sensitivity has not developed, or (*b*) in advanced disease of any kind where reactive ability is lost, is no indication of the absence

of tuberculosis. There is the possibility of the sensitivity to tuberculin varying from time to time during the life of an individual. A tuberculin test is of no value in the diagnosis of tuberculosis. A tuberculin test is of no value in the treatment of tuberculosis. A tuberculin test may be of value in prognosis, as an index of the individual reaction to the tuberculous process. This index depends upon personal interpretation, and must be coupled with efficient and repeated physical examination. The best test is the intracutaneous one, because (1) it is localized, (2) it is visible, and (3) it can be done with definite and very dilute amounts of toxin. The value of this method is particularly efficient in the testing of cows for evidence of tuberculous infection.

FROM ERIC E. ATKIN,
B.A., M.B.,
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Koch originally introduced tuberculin for therapeutic use in tuberculosis. In this respect it has been practically an unqualified failure, but it has rendered service as a test of tuberculous infection. As a result of infection with the tubercle bacillus the tissues of the body become sensitive to the bacillus and its extracts, giving a violent inflammatory reaction on contact with them. The individual has become *allergic*. Tuberculin is therefore a test of infection, which is not synonymous with clinical disease. Owing to the fact that the majority of adults in civilized countries have become infected somewhere in their bodies with the tubercle bacillus, human or bovine, its use is limited to determining whether a child has already been infected or not. This fact has led to the use of tuberculin in large-scale investigations of school children, and interesting results have been obtained regarding the age of infection in different communities. For instance, the much greater danger of a child becoming infected in a home where a member of the household is suffering from open pulmonary tuberculosis than in one free from the disease has been proved. For these mass investigations the Pirquet test has commonly been employed, which is done by applying tuberculin to a superficial cut on a sensitive part of the skin (the flexor surface of the forearm). Koch's original "old tuberculin" is generally used. Latterly, however, there has been an increasing tendency to apply the intradermal test of Mantoux, and it is surprising what little discomfort this test causes to even quite small children. It is a little more sensitive than the Pirquet test, and for this reason is likely in time to be universally employed in preference to the test of Pirquet. To be genuine, the inflammatory papule should be at its height at the end of forty-eight hours. A negative Pirquet reaction is sometimes positive on repetition of the test.

FROM J. STANLEY WHITE,
M.R.C.S., L.R.C.P., F.C.S.,
Pharmaceutical Chemist.

For many years the von Pirquet reaction has been employed as routine, but there is every indication that this will be superseded by the Mantoux intracutaneous test. Other tests, notably the subcutaneous test of Koch—where the diagnosis is based on the rise in temperature—the ophthalmic reaction of Calmette, the cutaneous reaction of Pirquet, the blister reaction of de Carle Woodcock, and the skin reaction of Moro, have largely fallen into disuse. The Mantoux reaction is not new, but during the last two years it has come to be regarded as perhaps the most satisfactory of the tests with old tuberculin. The recent report by Dr. P. D'Arcy Hart, whose work forms the subject of a Medical Research Council Report, makes it clear, however, that the test is chiefly of value when negative. His practical conclusions are as follows: (1) All children up to the age of two years who give a negative test should be segregated from persons suffering from tuberculosis themselves, because they are liable to develop a severe and even fatal form of the disease if they are not. (2) A negative test between the ages of two and twelve years indicates that any symptoms from which the child is suffering are not due to tuberculosis. (3) The value of the test in diagnosing tuberculosis in adults is nil, as the majority of healthy adults give a positive reaction. In all the tests referred to Koch's old tuberculin forms the basis of the reagent. In addition to the exotoxin excreted by the tubercle bacillus during growth, it obviously contains protein from the medium, and this raises another aspect—namely, the possibility of the reaction being of an allergic character. It is conceivable that some patients may react, not because they are tuberculous, but because they are sensitive to the protein in the broth in which the tubercle bacillus has been grown. In this connection the team work which has been going on in America during the last two or three years is of the greatest possible interest. Chemical examination has indicated that the exotoxin produced by the tubercle bacillus grown on a synthetic medium can be separated into four fractions, one of which is termed the tubercle ultra-protein. Some preliminary work suggests that this may ultimately replace old tuberculin, which hitherto has formed the basis for all these tests.

FROM ALAN A. MONCRIEFF,

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As a result of a study of over two hundred children at the Hospital for Sick Children, Great Ormond Street, London, in whom the intracutaneous injection of tuberculin according to the method described originally by Mantoux was employed, the following conclusions were reached: (*a*) The value of a negative reaction is reduced by the possibility of several fallacies. The tuberculin used may not be potent, the injection may be made subcutaneously instead of intradermally, the patient may fall into the small group where bovine tuberculin is necessary to obtain a positive result and is negative with human tuberculin, or, finally, the patient may be in such a state of acute tuberculosis or some other acute illness not due to tuberculosis (such as measles) that a negative result is obtained with ordinary doses of tuberculin. All these positive dangers connected with negative results with tuberculin are comparatively easy to combat by careful work, but they must always be borne in mind when interpreting results. With these reservations a negative reaction with intradermal tuberculin is usually a valuable help in excluding tuberculosis. (*b*) A positive intradermal tuberculin reaction at the most means that the patient has at some time or other been infected with tuberculosis. If the test is not carefully controlled it may not even mean this, and the older the child the more likely is the tuberculin test to be useless in the diagnosis of the nature of the illness affecting individual patients. But where this age limit is to be fixed, below which a positive test is to be accepted as of value, it is most difficult, and in the series upon which these remarks are based even at fifteen months of age one child gave a positive tuberculin reaction while recovering completely from a streptococcal empyema. Even in the early years of life there is a very wide margin of error if a positive tuberculin test is to be regarded as indicating the nature of a particular patient's illness. The positive Mantoux reaction must, therefore, be utilized for diagnostic purposes with considerable restraint. A positive result at even an early age should never be allowed to establish a diagnosis, but should merely take its place as a piece of evidence to be taken into consideration in the process of making a diagnosis, to be disregarded if necessary. After the first few years of life it becomes even more important to avoid establishing for any pathological condition in a child a diagnosis based mainly or entirely upon a tuberculin reaction. For surveys of large groups of children this test has proved its value, but for the individual patient with vague

symptoms suggesting tuberculosis the Mantoux reaction, in common with all tuberculin tests, may be a good servant but is a dangerous master. The full details of the investigation here quoted were published in the *Quarterly Journal of Medicine*, 1931, vol. xxiv., p. 153.

FROM WILFRID F. GAISFORD,

M.D., M.R.C.P.,

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Looking back over the records of some three thousand children on whom I have performed the intradermal tuberculin test of Mantoux, I become more and more impressed with its value; it would seem to be the most valuable routine test at the disposal of pædiatricians. From a study of these children I feel that one can state that a negative reaction with 1 mg. O.T. (0·1 c.c. 1 100 O.T.) indicates freedom from tuberculous disease. Certainly I have yet to encounter a case of tuberculosis confirmed by examination of sputum, urine, or cerebrospinal fluid, or at biopsy or autopsy, in which a Mantoux test (1/100) had not been positive. Furthermore, many cases have occurred in which a diagnosis of tuberculosis has been refuted by a negative test—and rightly refuted, as subsequent findings revealed. A negative Mantoux is therefore of inestimable diagnostic value in cases of enlarged cervical glands, chronic coughs, diarrhœa and loss of weight, etc. A positive reaction is helpful in many cases under the age of five years, though it may be of little significance later. No child, however, should be branded as tuberculous or recommended for sanatorium treatment without a positive Mantoux.

FROM W. E. SNELL,

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The use of tuberculin tests in diagnosis depends on certain facts which have been established as a result of methodical research, carried out chiefly in America and this country, and recently admirably summarized by Dr. D'Arcy Hart. These facts are: (1) The Mantoux intradermic test is considerably more reliable than the Pirquet test; (2) a positive reaction is an indication of tuberculous infection, but not necessarily of tuberculous disease; (3) after the age of twelve, 50 per cent. of the normal urban population show a positive reaction, gradually increasing to 90 per cent. at the age of twenty-one. Below the age of five, however, positive reactors form only 20 per cent. From these considerations it is obvious that the Mantoux test has its greatest use in infancy and early childhood. It is applied in the following manner:

(*a*) At any age a negative Mantoux excludes tuberculous infection (allowing for a 4 per cent. error); (*b*) in any child or "contact" child under twelve years showing signs and symptoms suggestive of tuberculosis, a positive reaction lends considerable weight to a definite diagnosis of tuberculosis, and will, at least, indicate the desirability for further investigation by X-ray examination, etc.; (*c*) in any "contact" under the age of five, whether apparently healthy or not, a positive reaction is an indication that the child should be kept under regular observation. In practice, I find it convenient to mark the case papers of all positive Mantoux "contacts," and also all unhealthy children showing a positive test, with a red star. These constitute a special group of "suspects," who are kept under regular observation for a long period. From a practical point of view, I have no doubt that the Mantoux test has a very definite, though limited, value.

FROM JAMES CALVERT SPENCE,

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Hon. Assistant Physician, Royal Victoria Infirmary, Newcastle-on-Tyne.

In my opinion the tuberculin skin reaction is one of the most valuable and reliable diagnostic tests in medicine, if its limitations be recognized and if a proper technique be used. Its main value is in the diagnosis of disease in children under ten. Without space for argument, I would state my view by saying: *No child should be committed to a diagnosis of tuberculosis unless this has been confirmed by a positive skin reaction.* Thus it has two grades of value—(1) in excluding tuberculosis as a cause of symptoms which may clinically suggest it, and (2) confirming a clinical diagnosis of tuberculosis in a young child. The younger the child the more reliable is the test; and it is used as a routine procedure in my wards in all cases of doubtful diagnosis under the age of three. I have known a boy of seven treated for two years in a sanatorium for tuberculosis at ruinous expense to struggling professional parents on a laboratory report, in which on one occasion a few tubercle bacilli were said to have been found in the sputum. Seen later, he had a persistently negative skin reaction. He never had tuberculosis. Cases of arthritis of the hip and other joints are treated as tuberculous without a skin reaction test. This is absolutely unjustifiable. A number of these have negative skin reactions and are not tuberculous. The intradermal test (Mantoux) is the most satisfactory method, but used intelligently the older skin-scratch method (Pirquet) is almost as good. I have seen no ill results follow its use.

ORIGINAL ARTICLES.

VACCINATION AGAINST TUBERCULOSIS WITH BCG: THE PRESENT STATE OF THE QUESTION.

By PROFESSOR A. CALMETTE,

M.D.,

From the Pasteur Institute, Paris.

In a volume recently issued from the Pasteur Institute[1] tuberculosis workers may find complete documentary information on the subject of BCG. It contains forty-six reports from distinguished clinicians, bacteriologists and veterinary surgeons working in the principal nations of the world, confirming and emphasizing the facts presented and discussed at the International Tuberculosis Conference held at Oslo, August, 1930. Records and reports from experts also appear regarding the recent experiences and inquiries at Lübeck.

By the study of our latest publications, members of the medical profession everywhere are now in a position to judge as to the value of BCG as an effective weapon against one of the most terrible calamities which still continues to afflict humanity.

I will only recall here that BCG (bacillus Calmette-Guérin) is a living virus of bovine origin. It is comparable to cowpox. BCG is a preparation artificially attenuated in its virulence by a long series of cultures on strongly alkaline media containing ox bile. This attenuation is hereditarily fixed, as is the case with Jenner's vaccine and Pasteur's vaccines against anthrax and hydrophobia. When BCG is introduced into the human organism, or into animals susceptible to tuberculosis, it causes manifest resistance against virulent superinfections, just as very slight spontaneous virulent infections (paucibacillary infections, as we call them today) may cause a particular state of immunity, by which ulterior and more abundant infections become inoffensive.

The principal difference between the two kinds of vaccination, the one artificial, the other spontaneous, consists in the absolute innocuousness and efficaciousness of the first, whereas one never knows what

[1] "Vaccination Preventive de la Tuberculose de l'Homme et des Animaux, par le BCG: Rapports et Documents provenant des Divers Pays (La France exceptée) transmis à l'Institut Pasteur en 1932." Pp. 366. Paris: Masson et Cie, 120, Boulevard Saint-Germain. 1932.

may happen in regard to the second; some day, under the influence of pregnancy, infectious eruptive diseases, or other noxious incidents, progressive and more or less serious lesions may be initiated or slumbering trouble aroused.

BCG differs from ordinary preparations containing tubercle bacilli only by its almost total lack of virulence. It possesses definite antigenic properties, and consequently produces antibodies, and in culture media forms tuberculin. But BCG is perfectly harmless for all animal species susceptible to tuberculosis. In vaccinated individuals it gives rise to the appearance of *tuberculin allergy*, just as the ordinary bacilli of tuberculosis do, and though it is not a criterion of immunity—for immunity may exist without allergy—it gives evidence of the parasitic infection of the organism.

Since the experts at the Lübeck Judicial Investigation published their reports, and following the last publications of Professor William H. Park and his co-workers in New York, Dr. Stanley Griffith in Cambridge, Professor Gerlach in Vienna, and others, it is not possible for us to have any doubts as to the perfect and manifest innocuousness of BCG. No clinical or experimental facts can be alleged to confirm an eventual return to virulence of BCG in the human organism, as it was feared might prove to be the case. This doubt existed specially in England. We can with certainty reassure those who hesitate to use a living tubercle vaccine. I have no hesitation in claiming that during ten years of BCG vaccination not a single accident has been observed that could rightfully be attributed to BCG. I contend that killed vaccine or bacterial extracts are never efficacious as a prophylactic and therapeutic agent in the control of tuberculosis. Only a living vaccine can be of any use, because immunity against tuberculosis can only exist as long as some virulent or attenuated living bacilli are present in the organism.

The protective properties of BCG are unquestionable. They have been demonstrated by a great many experiments on various sorts of animals, and there is no reason why man should behave otherwise.

Now we know that a great number of very young children already possess a positive tuberculin allergy—*i.e.*, are carriers of a latent infection by tubercle bacilli; and consequently it appears necessary to vaccinate babies with BCG during the first days of life, before they have come in contact with tubercle bacilli. This may be realized the more easily in new-born babies, as they still are susceptible of oral vaccination; and the families always prefer this mode to subcutaneous injection. We are allowed to adopt the oral manner of vaccination in new-born infants, because their intestinal epithelium is still permeable for microbes and even for toxins, as is indeed the case apparently in most new-born animals.

Abundant experimental proof has been borne in France, and in many other countries, to the fact that infants, having absorbed BCG within the first ten days of life, resist all tuberculous family contaminations. It has even been noted everywhere, that children vaccinated with BCG develop better, and are less susceptible to contract children's diseases than non-vaccinated ones, living and brought up under the same conditions. This curious phenomenon is due to the fact that BCG causes a paraspecific immunity besides the specific antituberculous one. Recent experiments on animals have irrefutably proved the existence of this paraspecific immunity.

In view of the above claims, one does not wonder that a striking diminution of infantile general mortality has been recorded in countries where BCG vaccination is practised on a large scale—*e.g.*, in Rumania, Poland, Spain, Sweden and Hungary. The example of Rumania is particularly striking. In this country BCG vaccination has been introduced in fifty-eight cities, in some of which 90 per cent. of all the newborn babies have been vaccinated with BCG; and the Rumanian, statistics show that the infantile mortality amongst vaccinated children is only half as high as the non-vaccinated infants' mortality. The same fact is to be observed in France, where more than 450,000 childen have been vaccinated with BCG since 1924, both in tuberculous and in apparently normal and non-tuberculous families.

We are able today to measure the important preservation of young human lives due to BCG vaccination when we read the forty-six reports, addressed to the Pasteur Institute from various parts of the world, and recorded in the volume to which I have referred at the commencement of this paper. When we summarize these reports, we find that in forty-six countries (except France) 443,656 infants have been vaccinated with BCG, and that the average mortality from all causes at the age of 0 to 1 year has been: (1) In vaccinated children, 7·9 per cent.; (2) in non-vaccinated children, 15·3 per cent.—*i.e.*, nearly 50 per cent. less in the vaccinated children. These figures are certainly correct, and have been computed by expert statisticians in Sweden, Holland, Poland, Rumania, New York, etc. The only conclusion they suggest is, that it is the duty of the sanitary authorities of every country to approve BCG vaccine, and to see that this preparation properly prepared under their own supervision is placed gratuitously at the disposal of doctors for use in all families, in order that we may check the calamitous ravages and widespread afflictions arising everywhere from tuberculosis.

TUBERCULOSIS INFECTION IN INFANCY AND CHILDHOOD.

By DAVID R. HAMILTON,

M.D., D.P.H.,

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THE following observations are based on a study of 1,092 children who might be considered representative of the average family in an industrially depressed area. Tuberculous infection was determined by the Pirquet test. This method has been discredited of late and the weight of evidence as summarized by Dr. P. D'Arcy Hart is very much in favour of the intracutaneous method of Mantoux.[1] However, the "reserve of strength" possessed by the quantitative method seems to possess practical advantages only when sensitivity is low, and not throughout the range of usual allergic response. The errors in interpretation of border-line reactions observed in this investigation were minimized by an appeal to the more delicate intradermal test.

The general results reveal the progressive increase in incidence of infection with increasing age, and correspond closely with the results of other comparable studies. One rather interesting point deserves mention. A rather sharp increase of infection occurs between the age of two and four years. By the age of two years approximately 1 in every 10 children is infected. At the age of three the ratio increases to 1 in every 3. It is usually apparent in the total group, in boys, in girls, and in children with no clinical disease. Bearing in mind the fact that a considerable number of positive reactors under two years die of fulminating tuberculosis, children at this age seem to come suddenly into contact with an additional and common source of infection. Household contact with "open" cases and ingestion of infected milk apply with equal weight at each year of life. A view expressed by Austrian[2] in explanation of a slightly different aspect of infection, and again by Scott,[3] may provide the explanation. At this time of life children have just learned to toddle about confidently by themselves. They play about on the pavements and in the gutters, and their enjoyment is keenest when they are rolling about in the dust and mud. They are essentially "ground animals," and Scott refers to the "dirty" age. Their hands become infected, they ingest or inhale infected material, and it is not improbable that the dirt of these pavements and streets

[1] See Medical Research Council, Special Report Series, No. 164.
[2] Austrian: *Tubercle*, October, 1924, vol. v., No. 1.
[3] Scott: Medical Research Council, Special Report Series, No. 149.

is laden with tubercle bacilli. The habit of expectorating is still a promiscuous one, and every case of ambulant spit-positive pulmonary tuberculosis is not on the tuberculosis registers and provided with a sputum bottle. This view is consistent with the theories of the mode of dissemination of tuberculosis, and recognizes the universality of contact of all children over two years with tuberculosis.

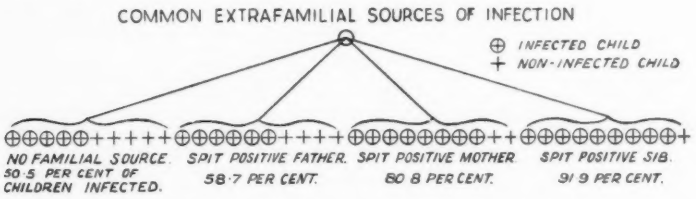
In this connection one may derive some guidance as to the usefulness of the tuberculin test. Under the age of two years in the diagnosis of obscure symptomatology a positive reaction is sufficient to decide the diagnosis. Even without symptoms the positive baby is harbouring an *active* focus which may or may not manifest itself in clinical disease. In this respect the test is comparable with the Widal in obscure cases of paratyphoid. After the age of two years the positive reaction has little diagnostic significance. On the other hand, in later childhood a negative reaction is of enhanced value in excluding tuberculous disease. With this conception of its value the test deserves greater attention by tuberculosis officers as a routine application among children. Its occasional failure in the presence of tuberculosis is of relatively little importance.

The effect of *familial contact* with an "open" case of tuberculosis is evident from the figures. The incidence at each age is higher among the contacts than among the non-contacts. With the exception of Drolet[1] and Fishberg,[2] whose figures do not reveal any marked difference with the two groups, this conclusion coincides with the consensus of modern opinion. However, it is worthy of note that although the incidence of infection is definitely higher among older contact children than among the younger, there is not the same gradual increase from birth as among the non-contact group. The immediate source of infection among contacts is common to all ages, and the maximum incidence is speedily reached within the first few years. In other words, in an environment of spit-positive tuberculosis, children are readily infected in the very early years of childhood, while children not so domiciled derive their infection later in life, presumably from the usual social and environmental sources of contact. That the incidence of infection from such extrafamilial sources may be as high as 50 per cent. by the age of seven only serves to emphasize their importance, and in no way detracts from the greater danger of exposure in the home. The dominating factor is the opportunity of infection; the greater the danger the higher the rate of incidence.

The most potent source of familial infection is the *spit-positive brother or sister*. Close behind is the *spit-positive mother*, while the paternal source is relatively unimportant, a fact which has been observed in

[1] Drolet: *American Review of Tuberculosis*, vol. x., No. 3.
[2] Fishberg: "Pulmonary Tuberculosis." Fourth edition. London: Henry Kimpton. 1932.

other similar studies. In the accompanying diagram an attempt is made to illustrate the relative danger of these familial sources of infection.



In any hypothetical family of ten children under fifteen years with no familial source of infection, five may be presumed to have become infected from extrafamilial sources. In any similar family, if the father suffers from spit-positive pulmonary tuberculosis, the effect of this additional source of infection is to raise the number of infected children to six. If the "open case" be the mother, eight of the children are infected. If it be a brother or sister, nine are infected.

An analysis of results in respect of *intimacy of contact* is also interesting. A child who sleeps with a spit-positive relative can hardly escape infection. The more effective the isolation of the patient the less is the risk of others becoming infected; but even with the patient isolated at home in a room by himself, the children of that home are in greater danger of infection than children with no family exposure. These conclusions are vividly illustrated by the actual figures, and amply substantiate the statement that the dominating factor in tuberculous infection is the opportunity for infection.

Overcrowding is closely associated with intimacy of contact. When overcrowding based on the standard of over two adults per room exists in the homes of spit-positive contacts, infection occurs with definitely greater frequency among these children. Independent of the size of a house accommodating an "open" case, the risk of infection is greater in the overcrowded house in the proportion of 3 to 2.

The influence of *malnutrition* as a factor in the spread of tuberculous infection is not easy to assess, at least in the general population of children. Published statistics are not convincing of any association as cause and effect. From my own figures two facts emerge. Firstly, in the first quinquennium of life good health is a more frequent concomitant of latent tuberculosis than malnutrition; and secondly, the incidence of malnutrition diminishes with age, while infection increases with age. It would seem justifiable to conclude that in the general population at least tuberculous infection is not a factor in the production of malnutrition. However, studying the relationship among contacts—*i.e.*, among children exposed to a more certain and continuous

infection—the figures show a sufficient difference to appear to have some significance contrary to the conclusion just established. In the undernourished contact children the incidence of infection is very considerably higher than in the normal contact, and the more severe the degree of malnutrition the greater is the incidence of infection.

All these contacts are equally exposed; the undernourished children have just the same opportunities of infection as the normal children, and the conclusion seems to be that the child's growth is retarded because of the infection—an infection which perhaps is unrecognizable, but forming an active focus somewhere in the body and deranging the normal metabolism, produces a state of malnutrition. Undernourished contacts should therefore receive the same consideration that is extended to the case of clinical disease.

THE TUBERCULOSIS PREVENTORIUM.

By NORMAN TATTERSALL,

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One of the most widely discussed tuberculosis problems in recent years has been the relationship between childhood infection and adult disease. That a considerable proportion of tuberculosis has its origin in infection occurring in early life must be abundantly clear to anyone who closely studies the possibilities of infection and reinfection as met with in adult cases. It is also becoming ever more widely appreciated that of those children in whom we discover incontrovertible evidence of tuberculous infection only a very few develop clinical disease in later life. When the child contacts of an infective adult case are brought under review it often occurs that some of the children are described by the parents as "always ailing," having a chronic cough, presenting lassitude or other symptoms, whereas other members of the same family "never ail anything," "eat like horses," etc. There is a natural tendency in such circumstances to concentrate attention on the delicate child and lightly to dismiss the non-symptomatic children as requiring little, if any, investigation. But when the young adult case of tuberculosis appears at the dispensary I have repeatedly been impressed with the fact that whilst there may be evidence of home contact in earlier years, the patient and the relatives are emphatic that he was always the strong and healthy child of the family, the one who "never ailed anything." Such cases, of course,

form only one group of tuberculous adults, but their frequency is thought-provoking. Do we concentrate too much on the "symptomatic contact"? We know from repeated observations by many workers that at fifteen years of age something like 70 per cent. of all children give a positive tuberculin reaction, and that such reactions occur earlier in families where there is contact with a sputum-positive case. Under ordinary working-class domestic conditions we can assume that it is practically impossible for children living in contact with an infected adult to escape infection.

May we go further and suggest that of such infected children those who develop symptoms and present stigmata of infection are the ones whose immunizing response is being fully called into action with the consequent development of a fairly effective degree of immunity, whilst the infected but symptomless child is harbouring tubercle bacilli by virtue of his natural resistance and without the development of an active immunity? If this were so, would it not explain the breakdown of many of the latter group on their emergence into the stresses of early adult life, and the relatively rare development of clinical disease in those who as children were recognized as "tuberculous seedlings"?

The work of Opie, McPhedran, and others, as well as one's personal observations, have shown that diffuse infiltrations and unstable latent apical lesions occur especially in the second decade of life, that they may be found quite apart from any symptoms or physical signs, and in well-nourished and healthy-looking children. These lesions are usually discovered radiologically, and are of more serious import than the more obvious clinical evidences of tuberculous infection in younger children, which we are at such pains to discover, and in the treatment of which so much money is spent.

The above remarks are relevant in discussion of the value and nature of preventive measures in childhood. During the 1930 visit of British tuberculosis workers to Canada and the United States, which was made possible by the generosity of the Sun Life Assurance Co. of Canada, the subject allotted for my special investigation was that of "Preventoria."

The danger to children from home contact is universally recognized, and has been the inspiration of world-wide activity. Massive infection in the great majority of cases occurs in the home, and whatever may be the actual relation between childhood infection and adult disease, there can be no defence of a policy which allows continued home contact without any attempt to ameliorate conditions or raise individual resistance. On the Continent of Europe and especially in France the ideal method of long separation by means of the Grancher System has been extensively carried out. No large-scale operations by this method have been attempted in this country or in Canada, and

there would appear to be deep-seated objections in the Anglo-Saxon temperament to such a scheme which are likely to prevent its wide adoption. We have, therefore, to do all in our power to minimize home infection by prolonged hospitalization of the infective case, improved hygiene and care in the patient's home, and the provision of open-air schools, holiday homes, sanatoria schools, and the like.

All these agencies are adopted in Canada, but particular attention has been paid to the development of the tuberculosis preventorium. At almost every sanatorium visited there was a children's block, usually called the "Preventorium," and in Toronto a particularly happy visit was paid to a preventorium, which is a self-contained institution run in conjunction with the chest clinic of the local Hospital for Sick Children, and which appeared to have a better claim to the title "preventorium" than many other buildings which passed under the same name. The preventorium block in many institutions which the party visited appeared to cater for children with quite definite pulmonary lesions, associated with marked physical signs and X-ray findings, and as such was similar in scope to the children's block in most English sanatoria. The preventorium in Toronto is a parallel institution to our own residential "sanatorium school," and caters especially for those children who, although showing no definite lesion at the moment, are in grave danger of massive infection by reason of home contact with an infective case. Whilst the child is in the institution the home problem is tackled, and thus the work done is truly preventive.

The booklet issued by the Toronto institution gives the following definition of its scope: "A preventorium for children is essentially a rest home, where under careful supervision the three great preventives of disease may be had in abundance—namely, fresh air, good food, and rest. The children who are admitted . . . are not active cases . . ., but they have lived in unhealthy surroundings and have been exposed to infection through some tuberculous member of the family."

Dr. Harold Parsons and Dr. J. H. Elliott welcomed our party to the Toronto Preventorium, and both at the institution and at a previous demonstration at the chest clinic at the Hospital for Sick Children gave a full account of their criteria of infection and the standards by which children are considered suitable for admission. The intracutaneous tuberculin test is widely applied, and its findings held in great respect. Since 1914 all the milk used in the city of Toronto has been pasteurized under municipal control, and it is claimed that this has virtually abolished abdominal tuberculosis from the city. This statement was strongly supported by the fact that for the last six years not one case of abdominal tuberculosis has been found in the post-mortem examina-

tions at the children's hospital. Based on this belief Dr., Parsons made the categorical statement that "If a child" (in Toronto) "reacts to tuberculin and has no outward or X-ray evidence of tuberculosis elsewhere, it *must* have tracheo-bronchial tuberculosis." The criteria for admission to the preventorium at Toronto are: (1) Exposure to infection; (2) a positive tuberculin reaction, with poor home environment; (3) convalescence from pleurisy or pneumonia, especially in "contacts."

Positive reactors to tuberculin whose home surroundings are good are not admitted, but are reported to the school medical officers for special supervision. Cases showing definite clinical or X-ray lesions are sent to the children's block at the sanatorium and not to the preventorium.

The institution was originally intended only for children from four to fourteen years of age, but in 1920 an additional block was built to accommodate young babies, so that provision can be made to separate the youngest infants from home infection, especially when born of a tuberculous mother. The total provision is 120 beds; 88 for children of four to fourteen years of age, and 32 for babies up to four years. The children are all admitted through the chest clinic of the Hospital for Sick Children, and before admission tonsils and adenoids are treated if necessary, as well as Schick and Dick tests, with immunization as required. The building is admirably adapted to its purpose, large verandas or "sleeping porches" opening from the wards, which allow of rest and sleep under open-air conditions all the year round. Separate dining-rooms are provided for the older and younger children. One of the most striking features of the building is a huge covered playground. This is a separate building 66 feet long, 40 feet wide, and 18 feet high, with windows which allow both sides to be almost completely open. This room contains swings, see-saws, a chute, merry-go-round, sandpit, and ample space for floor games. The winter schoolroom is the upper storey of this building, lessons in the summer being almost entirely out of doors. Treatment consists in a carefully regulated life—rest, school, play, and good feeding. Great stress is laid on training the children in habits of good personal hygiene. Excellent shower-baths are provided, and all the four to fourteen-year-old children have a daily shower all the year round. School teachers are provided by the education authority. School hours are two to three hours daily according to age, with a long period of bed rest in the early afternoon. The beautiful grounds give ample room for outdoor school and play, and the children also have their own garden, which provides additional interest and exercise. Three to six months is the usual period of treatment, though many of the young babies remain considerably longer. Much more might be written about this excellent institution, which in situation,

equipment, and routine may well serve as a model for any similar residential sanatorium school. The happy faces of the children were ample evidence of the truth of Dr. Parson's statement that they have "a whale of a time."

In addition to the Toronto institution the preventorium blocks of a number of sanatoria were visited. As already stated, these for the most part accommodated children with more definite lesions than those at the Toronto Preventorium. All were being conducted on similar general lines, and the one visited at the Royal Ottawa Sanatorium may be taken as typical of this group. Here also, as is only natural, most of the children were contacts to infectious cases. Children are recruited from clinics in the city as well as those held at the sanatorium. Many of the children in the preventorium block in Ottawa were contacts to adult patients under treatment in the same sanatorium.

Owing to the immense distances and scattered population in many parts of the country there have also been established travelling clinics, with portable X-ray plants, which tour round the country examining contacts of known cases, and seeing all new patients referred by local doctors.

Selection of cases was largely based on tuberculin tests and X-ray findings. The routine tests were intracutaneous injections, increasing from ·05 mgr. to ·5 mgr. of O.T. If no reaction, the child was considered free from infection. All children reacting to the above dosage were X-rayed, and subjected to careful clinical examination. Broadly speaking, those showing no clinical or X-ray lesion are not considered as requiring treatment; the remainder, as far as possible, are admitted to the institution. In passing, it may be mentioned that there was stated to be no difficulty in getting contacts up for examination, all coming readily when asked.

Treatment was on similar lines to that in Toronto, though owing to the more definite evidence of tuberculosis in most of the cases, many of them required prolonged bed rest, and were more or less febrile. A particularly fine series of X-ray films of diffuse "infiltrations" (epituberculosis?) was seen at the Ottawa institution. Another point of interest was that in several cases, although repeated examinations of sputum or fæces had been negative for T.B., these had been found in material from gastric lavage. The four-bed wards in this institution were separated by glass partitions and opened on to a balcony in front, while at the end of the block was a large sun-room.

In most of the preventoria visited, the children were clad in excellent "beach suits" with net fronts, allowing of plentiful exposure to sun and air. In Ottawa, sun-bathing was a routine of treatment in the summer, with exposure to quartz lamps in the winter, a temperature up

to 100° in these children not being considered a contra-indication to artificial irradiation.

Wherever we went the provision of institutional beds for children appeared to be on a generous scale, and Canada is certainly fully alive to the dangers of home contact and is working actively to prevent them.

When the sanatorium at Chicago was visited, we were naturally anxious to hear to what extent the provisions of their Glackin Act were being carried out, especially the clause under which "no child under the age of sixteen years shall live in the same home, apartment, etc., as a person suffering from active or open pulmonary tuberculosis." This, of course, is a counsel of perfection. Within ten days of a case being known to have a positive sputum, either the patient himself must be in hospital or find himself accommodation where there are no children, or the child contacts must be taken to the preventorium or housed suitably with friends or relatives. We were informed by the author of the Act that this clause is rigidly enforced in every case, and separation maintained until the death of the infectious case or his certification, after repeated clinical and bacteriological tests, as no longer being infectious. There is ample evidence that certain other prohibitions in the United States are capable of evasion, and it is a strain on one's credulity to believe that this magnificent ideal does not suffer a similar fate.

Do preventoria achieve the object at which they aim? Is it a sound policy to treat children who react to tuberculin, but show no other evidence of the disease? These are questions which require much further statistical investigation. What should be done for those children who have been in close contact with infection, but do not give a positive tuberculin reaction? In the opening remarks of this paper, it has been suggested that this group is a fruitful source of young adult tuberculosis, but as a rule these cases do not find their way to the preventorium; and if they did, would it affect their subsequent history? In a recent paper by Dr. R. J. Matthews in *Tubercle* (February, 1931), some suggestive figures are given of the ultimate fate of reacting and non-reacting contacts. A group of 120 contacts, who either gave a negative von Pirquet test or, if positive, showed no clinical evidence of disease, were followed up some eight or nine years later. Of the reactors (tuberculized), all had remained free from clinical disease, but no fewer than seven of the original von Pirquet negative children had developed definite tuberculous disease. Perhaps the future will provide some effective and safe method of pre-immunization for such non-reacting contacts.

It would hardly be right to conclude this paper without a reference to the discussions at the Winnipeg meeting on "Tuberculosis in Child-

hood," and especially to the address from Dr. McPhedran in which he spoke of his work on the diffuse tuberculous infiltrations of childhood. He laid particular emphasis on the importance of the recognition of the unstable lesions of adolescence, usually only discovered by X-rays, but which are all-important as the immediate precursors of young adult tuberculosis. These lesions above all others require active treatment and prolonged hospitalization. Dr. McPhedran suggested that while preventoria such as the one at Toronto are of real service, the ample provision of beds for children with unstable adolescent lesions is of even more importance, and the claims of this group must on no account be neglected in favour of the child who is merely tuberculized and in far less danger of developing active disease.

THE ERADICATION OF BOVINE TUBERCULOSIS

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Readers of the British Journal of Tuberculosis are fully aware of the human mortality and suffering from tuberculosis of bovine origin, and of the heavy expenditure involved in the treatment and after-care of patients suffering from this scourge, but they may not so well realize the heavy financial losses which cattle-breeders and stock-owners sustain from bovine tuberculosis. How very serious these losses are may be deduced from the following facts. In the five years 1926-30 no fewer than 82,283 cattle were slaughtered in Great Britain under the Tuberculosis Order—an average of 16,456 per annum. A low estimate of their value, had they not been affected, would be £15 per head, or in total, £1,234,245.

From experience gained in the working of the Order it can fairly be said that for every animal killed under its provisions at least two similarly affected were otherwise disposed of; on this assumption the total loss over those five years would be £3,702,735, or £740,547 annually. We may view the matter in another way: in June, 1929, there were approximately 3,128,000 cows and heifers in milk or in calf in Great Britain. Assuming that one-third of these were affected with tuberculosis in some shape or form—and that is a conservative estimate—there exists over a million tuberculous cows in the country. Without ex-

aggeration it may be said that each affected animal returns £2 per head profit less than it should do (taking into consideration all risks from the disease). On this assumption, agriculture is losing from tuberculosis £2,000,000 annually from its milking cows alone — leaving entirely out of account other cattle and animals. The amount of tuberculous meat condemned each year also amounts to a very large sum.

It is with these considerations in mind that the National Veterinary Medical Association has evolved a scheme for the eradication of bovine tuberculosis.[1]

The scheme is purely voluntary, no compulsion being advocated until the number of clean, or "accredited," herds in any area reaches 75 per cent. of the whole. The plan readily lends itself to development on a large or a small scale, according to circumstances.

Various agricultural organizations have considered the scheme, and it is hoped that eventually they will give it their support. The scheme rests or falls upon the efficacy of the tuberculin tests. The National Veterinary Medical Association believes that any divergencies in the results of the tests that may have arisen will be overcome if all tuberculin is brought to a guaranteed standard, and that with the adoption of the scheme greater experience in their interpretation will result. This contention is amply supported by the success which has accompanied the use of the tests in the United States of America, where the number of cattle tested has risen from 2,101 in 1917 to 12,845,932 in 1930; the number of reactors correspondingly decreasing from 4·9 per cent. in 1918 to 1·7 per cent. in 1930.

It may not be out of place here to illustrate how public opinion in America has changed by quoting one author, who writes as follows: "Practically all existing opposition to the tuberculosis eradication scheme is the result either of ignorance of the ravages of the disease and the tremendous annual toll it exacts from the live-stock industry, or else the result of the prejudice that results against tuberculin as a diagnostic agent. Those who are most familiar with the methods of eradication, however, are its strongest 'boosters.'" It is not too much to hope that were such a scheme as I have referred to applied in this country, it would not be long before the results achieved would promote such a change in public opinion with regard to this question as is reflected in the above quotation.

[1] A copy of the "Scheme for the Eradication of Bovine Tuberculosis in England and Wales," issued by the National Veterinary Medical Association of Great Britain and Ireland, may be obtained gratis on application to the offices of the Association, 2, Verulam Buildings, Gray's Inn, W.C. 1.

THE TUBERCULOSIS PROBLEM IN JERSEY.

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Tuberculosis is a problem which has to be dealt with according to one's means and requires investigation regarding every possible factor in its production. In this brief communication I desire to deal with the problem as we view it in Jersey.

Climate.—Sunny Jersey has a yearly sunshine record averaging 2,027·08 hours and an average rainfall of 32 inches. Our mean temperatures are 52·2° F., with a maximum and minimum mean of 83·7° F. and 26·1° F. respectively. The mean relative humidity is 79·2 per cent. Prevailing winds are westerly, but during February and March east winds prevail. The northern cliffs are from 400 to 250 feet above sea-level, while the land slopes to the south to sea-level. The valleys running north and south are sheltered from the north, but are exposed to south-westerly winds.

Inhabitants.—The old Jersey families only supply a small quota of the population. Some 300 years ago Huguenot refugees increased the population by one-third. Since then there has been a small but persistent inflow of Bretons and English, the former being chiefly labourers of child-bearing age. Intermarriage, as in all similar small communities, has occurred to a considerable extent.

Economic Conditions.—Of the existing 50,000 inhabitants, roughly 27,000 are town dwellers and 23,000 country dwellers. The wealth of the island depends on agriculture, which since the Great War has nearly met with disaster. The housing problem has hardly been dealt with since war days; many of the working-class dwellings are of the back-to-back type. Food prices are now slightly higher than in England. Each winter finds a larger number requiring public assistance. The Dole, National Health Insurance, Workmen's Compensation Act and Old Age Pensions do not exist.

The above data give a bird's-eye view of general conditions; we can now pass on to those factors which are more nearly related to the disease. Of the three types of tuberculosis—human, bovine and avian—bovine tubercle does not exist.[1] Avian tubercle has been introduced with modern breeds of poultry, but does not appear to cause any great loss. Human tubercle exists as an imported disease and to a greater extent than formerly.

TABLE I.: INDICATING "TOTAL" DEATHS FROM TUBERCULOSIS.*

Year.	*Total Deaths.*	*Quinquennial Rate per* 1,000.	*Rise or Fall.*	*Normal Fall.*
1901–1905	416	1·58	—	1·58
1906–1910	405	1·54	−·04	1·54
1911–1915	391	1·50	−·04	1·50
1916–1920	400	1·65	+·15	1·46
1921–1925	327	1·31	−·24	1·42
1926–1930	305	1·09	−·22	1·38
1931	50	0·99	−·10	1·372

In the above table it is seen that unknown factors have produced a "normal" fall of 0·04 per 1,000 per quinquennium for the first fifteen years. War conditions and the influenza pandemic converted the fall into a rise of 0·15 per 1,000. In the last two quinquennia the fall has been rapid. The only factor which has supervened is the starting of a bacteriological laboratory in 1922, thus allowing for the differential diagnosis of sputa in chronic lung infections.[2] This factor has had a psychological and an educational value. Patients suffering from chronic coughs no longer fear an examination of their sputa, with the result that patients are seen earlier.

TABLE II.: INDICATING DEATHS FROM PULMONARY TUBERCULOSIS AND OTHER FORMS.

Year.	*Deaths from Tuberculosis of Lungs.*	*Deaths from Other Forms of Tuberculosis.*	*Total Deaths.*
1922	69	17	86
1923	51	11	62
1924	55	10	65
1925	35	14	49
1926	46	7	53
1927	46	9	55
1928	37	10	47
1929	47	8	55
1930	38	6	44
1931	34	16	50

Table II. shows that there has been a fall in deaths from pulmonary tuberculosis. This variety of the disease is notifiable.

* Differentiated records are not available prior to 1922.

TABLE III.: INDICATING RESULTS OF SPUTUM EXAMINATIONS.

	1928.	1929.	1930.	1931.
Total number of patients examined	304	376	381	579
Number due to tubercle bacilli and blastomycetes	72	92	79	90
Number due to blastomycetes only	160	189	247	326
Number due to other organisms ...	62	94	55	163

Table III. shows the relative incidence of the various infections. Of blastomycetes, monilias preponderate; their importance as primary pyogenic organisms has been discussed in a recent note.[3] The rise of nearly 200 cases in 1931 is due to the foundation of a voluntary association at the end of 1930, known as the Chest Clinic. Treatment at the institution is free, but patients are only dealt with on a letter of recommendation from their family doctor. Arrangements are made for X-ray and bacteriological examinations. The Association is supplying the need for in-patient treatment this year; at present patients who are bed-ridden either remain at home or are admitted to the General Hospital.

In the present influenza outbreak many cases of pneumonia have been found associated with monilias. By treatment it is hoped to obviate the increase in tuberculosis of the lungs which so frequently follows influenza. The work now in progress, and which has been carried on for ten years, has for its keynote the recognition of blastomycotic infections and their pyogenic action, which lowers the resistance of the lungs when exposed to infection with the tubercle bacillus.

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CRITICAL SURVEY.

THE TUBERCLE BACILLUS SINCE KOCH'S DISCOVERY.

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When Robert Koch discovered the tubercle bacillus, just fifty years ago, it was not known that more than one variety of the micro-organism was involved. Koch himself thought that the bacilli causing the disease in man and animals were identical. Later, in the year 1901 in London he expounded his view, based on experiments, that the human and bovine bacilli were distinct, and that human tubercle bacilli do not cause a fatal generalized tuberculosis in cattle. He also expressed his firm belief that the bovine bacillus was for practical purposes negligible as the cause of disease in man. This took the medical world wholly by surprise, and led to an enormous amount of work being undertaken to confirm or disprove Koch's statements. Perhaps the most important fact that has emerged from these researches is that pulmonary tuberculosis is to all intents and purposes always caused by the human type of bacillus. Most sets of statistics give about 1 per cent. or less of lung tubercle as being caused by the bovine bacillus. Recently, however, a few cases of pulmonary tuberculosis occurring in young adults have been reported from Scotland, the cause of which was definitely proved to the bovine type of bacillus (Munro, 1928). This unusual finding requires explanation. Other distinct types of tubercle bacilli causing disease in animals are known, chief among which is the avian bacillus frequently met with in poultry, but attempts to incriminate them as the cause of disease in man have not been convincing.

In his original description of the bacillus Koch described the presence of spores. This proved to be incorrect. Considerably later, Much (1908), by a special method of staining, detected granules in old tuberculous lesions in which he could not find acid-fast bacilli. These granules, he believed, were virulent. His claims have been contested on the ground that acid-fast tubercle bacilli can be found if a sufficiently diligent search is made. A later development arising out of his work is the claim by French workers headed by Calmette that they

have proved the existence of a filtrable form of the bacillus capable of producing a modified type of the disease in guinea-pigs, but many investigators outside France have entirely failed to confirm the French results. The question was thoroughly discussed at the International Tuberculosis Congress in Rome (1928), but some of those who attended the Congress came away with the feeling that the French school had not proved their case.

A comparatively recent development in bacteriology is what is known as microbic dissociation. If a culture of a bacterium is plated on an artificial medium it often produces two kinds of colonies, some having a rough surface and some having a smooth one. But the interesting fact is that a segregation into virulent and avirulent organisms has taken place simultaneously, the smooth colonies containing the virulent variety, while the rough colonies consist of non-virulent organisms. The tubercle bacillus has been shown to conform to this phenomenon. Petroff (1927) used the method to dissociate the now well-known B.C.G. strain of tubercle bacillus, and found that he could separate it into virulent and non-virulent colonies. The importance of this fact will be realized from what follows.

Ever since the day the tubercle bacillus was grown on artificial media attempts have been made to use the bacillus in one form or another as a vaccine for the cure of the disease, in every case with conspicuous failure. Koch himself was the first to do this. He prepared tuberculin from the tubercle bacillus with this end in view, but, unfortunately, it has proved to have very little value as a curative agent. Although possibly of some value when administered judiciously in certain cases, it is certainly not the sovereign remedy it was at first acclaimed to be. Since then innumerable modifications of the original preparation have been tried: all appear to be equally ineffective. In experimental animals, a certain small degree of resistance can be produced by the inoculation of killed tubercle bacilli, but it does not amount to much, and will not protect against a heavy dose of the living bacillus. In recent years the idea has been gaining ground that a lasting immunity can be obtained only by resorting to a vaccine containing the living organism. As is now well known, Calmette and his French collaborators have produced and extensively tried out such a living vaccine. Starting with a virulent tubercle bacillus of the bovine type, Calmette, by a certain treatment extended over a number of years, has succeeded in practically reducing its virulence to nil, although, as mentioned above, Petroff claims that he has succeeded in finding some virulent bacilli amongst the avirulent ones. By administering this living culture to newly born infants by the mouth he claims to have enormously reduced the mortality from tuberculosis in cases where the mother was suffering from open tuberculosis and nursed her

child. Calmette's statistics have come in for a good deal of adverse criticism, especially by Greenwood (1928) in this country. The vaccine has been employed in a different way and for rather a different purpose in Norway. Only about half the probationer nurses arriving at the municipal hospital in Oslo for their training are found to have a positive tuberculin reaction. Part of their time is spent in the tuberculosis wards. As it was found that a number of cases of tuberculosis occurred amongst those nurses who started with a negative tuberculin reaction and hardly any amongst those with a positive one, it was decided to try the effect of vaccinating volunteers of the former group with B.C.G. as a prophylactic measure at the beginning of their hospital training. The subcutaneous route was the method chosen. The investigation has been proceeding since 1927, and Heimbeck (1931) sums up the results. Up to the present 160 nurses—with a negative tuberculin reaction, and therefore presumably uninfected—have been vaccinated with B.C.G. Three cases of tuberculosis have occurred among them as compared with 15 cases of the disease among 35 unvaccinated nurses who refused to have it done. The nurses coming to the hospital with a positive tuberculin reaction have, of course, been left alone. The figures have been dealt with by the Danish statistician, Professor H. Westergaard, who finds a morbidity of 4·08 per cent. among those starting with a positive tuberculin reaction; 33·55 per cent. among those starting with a negative reaction, and 2·49 per cent. among the vaccinated ones. These results are eloquent of the success of the method in producing some immunity against tuberculosis in previously uninfected persons. It is necessary to point out, however, that it is very possible, if not probable, that a similar result could be obtained by the use of a vaccine composed of *dead* tubercle bacilli, which we know will induce a positive tuberculin reaction in an uninfected animal. Apart from Calmette's contested results, this is probably the first real proof since Koch first tried tuberculin that the tubercle bacillus can be used to produce a definite degree of protection against tuberculosis in man.

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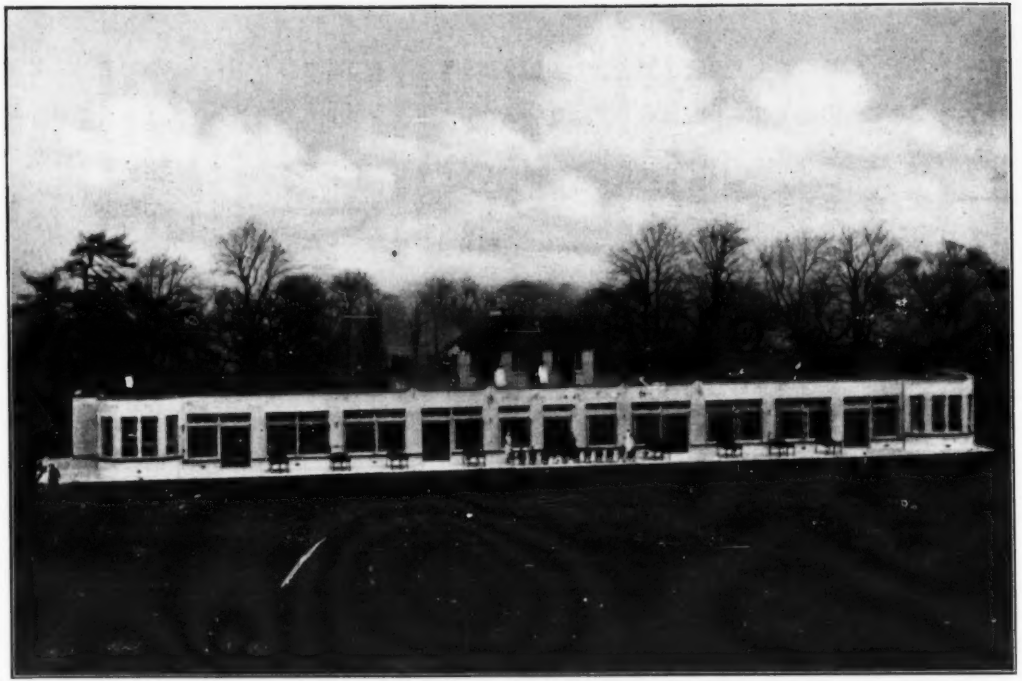
ASSOCIATIONS AND INSTITUTIONS.

THE ROYAL VICTORIA HOSPITAL TUBERCULOSIS TRUST, EDINBURGH.

We have received from the Royal Victoria Hospital Tuberculosis Trust the following interesting account of this serviceable enterprise :

"The modern movement to combat tuberculosis, which has become general throughout the world, was directly inspired by Koch's discovery of the tubercle bacillus. The extensive operations which have developed under the ægis of the Royal Victoria Hospital Tuberculosis Trust, and the antecedent Committee of Management, were commenced within six years of the recognition of the tubercle bacillus. In a recent appreciation contributed by Sir Robert Philip to the *Zeitschrift für Tuberkulose*, published in Berlin on the occasion of the jubilee of Koch's discovery, it was shown that what has been attempted in Edinburgh was inspired by the stimulus produced by the completeness of Koch's demonstration and the impelling fascination of the prospect that was thereby presented. Those who began the work were impressed by the widespread distribution of tuberculosis, its appalling mortality, its emergence at all ages, and the varied character of its manifestations, and no less by the economic stress and hardship produced by the long continuance of illness and the crippling effects on remunerative labour. It was the realization of the extent of the damage wrought by the bacillus which led to the foundation at Edinburgh of the Tuberculosis Dispensary (1887) as a receiving house and intelligence centre where information could be received and guidance given concerning the disease. Thereafter came the establishment of the Sanatorium (1894), followed immediately by the school for tuberculous children (1895), the opening of a pavilion for advanced consumptives by the municipality (1906), the inauguration of the Farm Colony for more continuous care (1910), the provision of a classroom and laboratory for the teaching of medical students and practitioners (1912), the establishment of the Chair of Tuberculosis in the University of Edinburgh (1917), the opening of the Sanatorium Colony, Southfield (1922), and the establishment of a tubercle-free herd of cattle (1923). Dr. Louis J. Dublin, Statistician to the Metropolitan Life Insurance Company of New York, has declared that the 'definite technique for the control of tuberculosis probably has received its best and most acceptable expression in the Edinburgh work. The underlying principle of the campaign has been that tuberculosis was subject to human control. The disease developed because of infection and the weakened defences of the individual. This might be due either to undesirable conditions of the organic and physical environment, or to weakened personal constitution, or to both. . . . The emphasis has been placed where it could be effective—namely, in the constant improvement of the status of human beings. The campaign against



THE ROYAL VICTORIA HOSPITAL TUBERCULOSIS TRUST: THE PAVILION FOR CHILDREN.

The New Pavilion for Children has been erected at the Southfield Sanatorium, Edinburgh. It is intended for the treatment of patients up to the age of twelve years suffering from any of the earlier manifestations of tuberculosis involving glands, abdominal structures, skin, genito-urinary system, bones, joints, etc. The building is of one story, and the wards open directly on to a raised terrace. There is also a roof garden with facilities for more intensive treatment by sun and air.

tuberculosis has attempted to make the lot of men and women happier and easier, to improve their personal hygiene, to remove possibilities of gross infection, and to give many individuals a fighting chance to throw off disease which they would not otherwise have in their usual methods of life. . . . The tuberculosis movement, therefore, stands clearly and outstandingly as a major force in what has been accomplished.'

"Recently a new pavilion for children suffering from tuberculosis has been opened in connection with the Southfield Sanatorium Colony. Accommodation is now available for some thirty children, up to the age of twelve, and suffering from any of the earlier manifestations of tuberculosis—*e.g.*, of glands, abdomen, skin, genito-urinary system, bones, joints, etc. The pavilion consists of a one-storied building, the wards of which open directly on a raised terrace so that the beds can be transferred from one to the other with the greatest ease. In addition, there is a roof garden with facilities for more intense treatment by sun and air. During the necessarily prolonged residence of the children care is taken to carry on education so far as this is compatible with the requirements of treatment. The services of a suitable teacher have been retained for the purpose, the object being not merely to maintain lessons, but to awaken the child's intelligent interest. The Department of Health for Scotland has issued a circular letter drawing the attention of the Medical Officers of Health throughout Scotland to the special advantages afforded by the Institution. Further information and Forms of Admission to Southfield and to the New Pavilion will be sent on application to the Medical Superintendent, Southfield Sanatorium Colony, Liberton, Edinburgh. The chief features of this latest addition to our Edinburgh Scheme are shown in the accompanying illustration."

We shall be glad to receive particulars regarding new hospitals, sanatoria, open-air schools for tuberculous subjects, and developments in connection with existing institutions. Copies of Reports and other publications will be welcome.

It is hoped that Medical Officers of Health and Tuberculosis Officers will kindly furnish us with copies of their Annual Reports and all other documents relating to Tuberculosis Services.

tuberculosis involving glands, abdominal structures, skin, genito-urinary system, bones, joints, etc. The building is of one story, and the wards open directly on to a raised terrace. There is also a roof garden with facilities for more intensive treatment by sun and air.

NOTICES OF BOOKS.

THE SANATORIUM TREATMENT OF PULMONARY TUBERCULOSIS.

THERE can be no two opinions as to the great value of the painstaking and thorough statistical investigation made by Dr. R. C. Trail and Mr. G. D. Stockman into the relative rates of mortality of patients with pulmonary tuberculosis admitted for treatment to the King Edward VII. Sanatorium and classified according to the stage of disease reached at the time of their admission.[1] Nevertheless, in considering the conclusions drawn from these studies, certain questions, both of facts and of values, suggest themselves. For example, as regards questions of fact, can it be conclusively proven that all the cases in which the presence of tubercle bacilli was never demonstrated in the sputum or fæces were cases of pulmonary tuberculosis? Assuming, for the sake of argument, that the answer to the above question is in the affirmative, is there any collateral evidence by which we could estimate the number of these cases that would have done equally well with modern methods of treatment outside a sanatorium? Let us now consider a matter of "values." At p. 7 the report states: "Table K . . . proves . . . the justification of continuing treatment only in such cases as are in the early or the moderately advanced stage." After all, every tuberculous patient is a human individual, and the "justification" for continuing his or her treatment is not the sort of thing that can be "proved," even by statistics. Dr. Morriston Davies, discussing statistics in a recent lecture, told his audience that "if you give all your cases, as they come, the best chance you can of recovery, your statistics will compare unfavourably with those of others who treat only 'early' cases, but you will get many gratifying recoveries that you did not expect"; and Dr. Gravensen, of Vejlefjord Sanatorium, Denmark, demonstrated at the recent annual meeting of the Tuberculosis Association the excellent results that can be obtained, even in comparatively advanced cases, by persevering with methods of selective collapse-therapy, assisted by sanocrysine. From the public health point of view it is generally agreed that the "hospitalization" of cases of advanced disease is of greater preventive value than the sanatorium treatment of early cases. Admittedly the terminal stages of the disease should not be spent in sanatoria for early cases. The ideal institution, as pointed out recently by Dr. MacNalty, is the "sanatorium-hospital." Modern methods of treatment are altering the character of sanatoria. The latter are becoming highly specialized chest hospitals, and there may well be a risk of their efficiency as such becoming seriously impaired by an over-valuation of statistics.

P. HEFFERNAN.

[1] "Pulmonary Tuberculosis: A Report upon the Experience of the Patients of the King Edward VII. Sanatorium, Midhurst, with Particular Reference to their Mortality after Treatment." By Richard R. Trail, M.C., M.A., M.D., M.R.C.P., Medical Superintendent, and George D. Stockman, F.I.A., F.C.S. Pp. 37, with 15 tables. Published by the Council of the King Edward VII. Sanatorium. 1931. Price 2s.

THE BEGINNING AND END OF PULMONARY TUBERCULOSIS.

Professor Bernard has written a monograph on pulmonary tuberculosis which is a typical French production, full of their characteristic love of logic and systematization.[1] It is doubtful though whether tuberculosis can be simplified to this extent; and much of that most important question in the whole subject—the onset of tuberculous infection in young adults—is based on X-ray evidence rather than on accurate pathological work post-mortem. As is usual now in France, the subject is divided into two main sections—the primary infection in childhood and re-infection—the author holding strongly that the majority of re-infections are endogenous in origin and start from the hilar region—a resuscitation of dormant tubercle bacilli. By "lymphogenic diffusion" radially, peripheral lesions appear in various characteristic situations: (1) Below the clavicle ("localization intercleido-hilaire" = Assmann's infiltration); (2) parahilar; (3) rarer situations—basal, juxtaparietal, and apical. These chapters are far the most interesting in the book, and are illustrated by excellent X rays and short clinical notes. It is a pity that cases with similar X-ray appearances in the lungs have not been examined by serial histological sections post-mortem to determine exactly what constitutes the various shadows. Finally, there are three chapters on the arrest of the primary infection, arrest of the re-infection, and tuberculosis and marriage. Dr. Bernard's work is altogether an excellent example of modern French opinion on tuberculosis: it is well printed and illustrated.

JOHN GIBBENS, M.A., M.B., M.R.C.P.

DIET AND TUBERCULOSIS.

Professor A. Bacmeister and Dr. Paul Rehfeldt have provided a comprehensive review of current Continental ideas on nutrition and diet in tuberculosis, pulmonary and non-pulmonary.[2] After chapters on metabolism and constitution, the authors proceed to give tables of food values, and then discuss the Hermannsdorfer-Sauerbruch diet, a modification of which is largely known and used on the Continent today under the name of the Gerson diet. Details of diet are given for febrile and for afebrile patients. Chapters follow on the feeding up of the thin tuberculous subject, and the methods of reducing weight without danger in the obese case. The authors then discuss the diet for the tuberculous patient with gastro-intestinal lesions, quite one of the most interesting parts of the book; finally diabetes and tuberculosis, and the nutrition of cases of renal tuberculosis. This book is probably the best yet published on the subject, and should be read by any specialist who wishes to be acquainted with all the recent Continental work. The style and printing are excellent, and the index is

[1] "Les Débuts et les Arrêts de la Tuberculose Pulmonaire." Par Léon Bernard, Professeur de Clinique de la Tuberculose à la Faculté de Médecine de Paris. Pp. 265, avec 71 figs. Paris: Masson et Cie., 120, Boulevard Saint-Germain. 1931. Price 40 fr.

[2] "Ernährung und Diät bei Tuberkulose," unter Mitwirkung von Professor Dr. Med. Adolf Bacmeister, Lettender Arzt des Sanatoriums für Lungenkranke in St. Blasien, von Dr. Med. Paul Rehfe dt, Polizei Medizinalrat in Köln a. Rh. Ss. xi + 187, mit 15 Tabellen. Dresden und Leipzig: Verlag von Theodor Steinkopff. 1932. RM. 13.50.

good, but no table of references is given. The most interesting chapters are those concerned with the Hermannsdorfer diet, the nutrition of thin or fat tuberculous subjects, and the dietetic treatment of the patient with gastro-intestinal lesions.

JOHN GIBBENS, M.A., M.B., M.R.C.P.

FRENCH AND GERMAN TUBERCULOSIS STUDIES.

It is quite impossible in the brief space available to do justice to the excellent volume recently issued from the publishing house of George Thieme.[1] It comprises a series of recent studies by experts on current problems in relation to various aspects of tuberculosis. The work of each writer has obviously involved a considerable amount of research, and the subjects are profusely illustrated and merit the closest attention of all interested in the recent advances in tuberculosis. Each article includes with it a most comprehensive bibliography. Tuberculous infection in primitive and civilized peoples is discussed in a comprehensive manner and especially in relation to epidemiology, significance of tuberculin skin reactions, the development of tuberculous disease and such problems as racial susceptibility, tuberculosis in a native population, in infancy and childhood. Then follow two admirable papers on the pathological and clinical aspects of "senile" tuberculosis. An excellent series of radiograms beautifully reproduced illustrate the types of this form of pulmonary tuberculosis. There is also a very comprehensive section on the general therapeutics of tuberculosis, the writer pointing out that the disease requires general treatment in addition to any local treatment of a particular organ. The history, indications and contra-indications of tuberculin therapy are fully discussed; chemotherapy with salts of copper and gold receives close attention. The use of arsenic, iodine, chaulmoogra oil, creosote and calcium are all discussed. There are a number of beautiful chest radiograms showing the effects of the treatment. Oleothorax is dealt with, and first from the historical and theoretical aspects. The indications and contra-indications of oleothorax are fully described as is the technique. The subject is illustrated throughout with diagrams, and excellent radiograms are reproduced. The subject of adhesions following artificial pneumothorax comes next and is admirably treated. The types of adhesions are classified, the indications for cauterization are discussed. A full list of instruments in use is described and the technique is vividly illustrated. The possible complications, and results of treatment are also outlined. One cannot speak too highly of the illustrations in this section. Finally, a section on the modes of healing of childhood intrathoracic tuberculosis is well treated. The value of serial radiograms is emphasized, and these are perfectly illustrated throughout. The work cannot be too highly recommended and should be in the possession of all interested in the recent advances in tuberculosis.

PHILIP ELLMAN, M.D., M.R.C.P.

Dr. Kutschera has published a monograph in which he discusses the whole course of tuberculosis from the stage of primary "infection"

[1] "Ergebnisse der Gesamten Tuberkuloseforschung Herausgegeben." Von H. Assmann, Konigsberg I., Pr. H. Beitzke, Graz H. Braeuning, Hohenkrug-Stettin St. Engel, Dortmund. Band IV. Pp. 494. Mit 197, zum Teil farbigen. Abbildungen. Leipzig: George Thieme, 1932. Price M.47: gel. M.49.

to that of the development of clinical tuberculosis.[1] Problems of "allergy" and "anergy" are dealt with, and the fact that tuberculosis exists from the time of the "first infection" until the death of the individual, always with the possibilities of certain factors influencing the onset of clinical disease from the most acute generalized to the chronic localized manifestations. Adult tuberculosis due to a "reinfection" is, according to Dr. Kutschera, chiefly of endogenous origin, and the so-called "exogenous reinfection" is, in his view, comparatively unimportant. The significance of immunity and the constitutional factor in the infected individual is regarded as of the greatest possible significance, and upon that factor the development and nature of the tuberculous disease depends. The writer emphasizes the significance of the constitutional factor from the therapeutic standpoint. The monograph is a useful and compact one, but it is unfortunate that no references are made to the abundant literature on the subject.

PHILIP ELLMAN, M.D., M.R.C.P.

Dr. Albert-Weil has made a new departure in his latest book in which he endeavours to co-ordinate varied types of experimental research, and having sought to deduce, from the results obtained, something of a real practical nature.[2] Numerous volumes on tuberculosis have appeared, and continue to appear, dealing separately with the chemical, histological, bacteriological and biochemical aspects of the subject, but research students will find few works which attempt to simplify their task by co-ordinating the abundance of literature on these varied aspects. Furthermore, from the writer's wealth of experience, the results are subjected to critical analysis, which adds enormously to the value of the book. Dr. Weil's plea for a joint systematized effort among research workers in tuberculosis is a very earnest one both in the interests of the prevention and treatment of this disease. His book is well written, the chapters are well classified and conclude with deductions of a most practical nature. There is a very complete list of references. PHILIP ELLMAN, M.D., M.R.C.P.

A TREATISE ON PULMONARY TUBERCULOSIS.

Dr. Fishberg's treatise on tuberculosis of the lungs, one of the most comprehensive and complete works on the subject in the English language, has for long been known and valued on both sides of the Atlantic.[3] This great exposition of all essentials relating to pulmonary tuberculosis is now in its fourth edition, and should be in the hands of every tuberculosis officer, superintendent of a sanatorium, and others

[1] "Tuberkulosebereitschaft und Tuberkuloseabwehr; Infection und Konstitution." By Hofrat Dr. Adolf Kutschera of Graz. Stuttgart: Ferdinand Enke. 1932. Price RM. 1.40.

[2] "Les Poisons du Bacille Tuberculeux et les Réactions Cellulaires et Humorales dans la Tuberculose. Esquisse d'une Conception Nouvelle des Processus Pathogéniques de la Tuberculose." By Docteur Jean Albert-Weil, Chef de Clinique Médicale adjoint à la Faculté de Médecine de Strassbourg. Préface du Professeur A. Borrel. Pp. viii+327, with 12 tables and illustrations. Paris: J. B. Baillière et Fils, 19, Rue Monteteuille. 1931.

[3] "Pulmonary Tuberculosis." By Maurice Fishberg, M.D., Chief of the Tuberculosis Service, Montefiore Hospital, and of its Country Sanatorium for Incipient Tuberculosis. Fourth edition, thoroughly revised. In two volumes. Pp. 567, with 138 engravings and 8 plates; and pp. 624, with 94 engravings. London: Henry Kimpton, 263, High Holborn, W.C. 1932. Price 70s.

responsible for the diagnosis and treatment of consumptive cases in this country. The author in his latest edition has admirably summarized and fully explained the advances of the past ten years in regard to our knowledge of the pathogenesis, diagnosis, prophylaxis, and treatment of tuberculosis of the lungs. The revision has been effectively carried out in a critical and yet practical spirit. A number of chapters, particularly those dealing with Demography, Pathology and Morbid Anatomy, Roentgenology and Therapeutic Pneumothorax, have been rewritten, as have also been the sections dealing with infection, pregnancy, tonsillectomy, sanatorium treatment, intestinal tuberculosis and other important subjects. The work is admirably arranged in chapters with effective sectional headings, and each volume is provided with a good index. Although the work is based on the author's own views and experience, there are accounts of the investigations of others, with serviceable references as footnotes. The illustrations have been carefully selected, and the diagrams and charts are particularly instructive. A fine series of full-page plates, some in colour, effectively illustrate pathological lesions. Dr. Fishberg is to be congratulated on the new edition of his great work, which firmly reestablishes it as the leading treatise in the English language on tuberculosis of the lungs.

TUBERCULOSIS OF BONES AND JOINTS.

In our issue for July, 1931 (p. 143), we directed attention to certain fine atlases, "Exploration Radiologique de l'Appareil Respiratoire," issued by the famous Parisian medical publishers, Masson et Cie. We have now received a further impressive volume, a member of the same series, dealing specially with tuberculosis of human bones and joints.[1] The work is based on Dr. Sorrel's long experience of cases at the celebrated Maritime Hospital at Berck-sur-Mer, and is essentially a practical clinical study and exposition of methods employed at this celebrated centre for the treatment of surgical tuberculosis. Dr. Sorrel is now connected with l'Hôpital Trousseau in Paris. In the preparation of his beautiful atlas and instructive monograph during the period of 1920 to 1930, no less than 10,000 dossiers have been considered. The work is effectively divided into four sections: Ostéites Tuberculeuses; Ostéo-Arthrites Tuberculeuses du Membre Supérieur; Ostéo-Arthrites Tuberculeuses du Membre Inferiéure; and Ostéo-Arthrites Tuberculeuses de la Colonne Vertébrale. In each section there is a systematic exposition dealing in order with generalities, pathological anatomy, symptomatology, diagnosis and treatment, medical, surgical and orthopædic The most notable features of this unique work are the beautifully produced and highly instructive illustrations, a large proportion being skiagrams of the highest excellence. Accompanying many of these are schema drawings with detailed descriptions of the features indicated in the X-ray photographs. We

[1] "Tuberculose Osseuse et Ostéo-Articulaire." Par Etienne Sorrel, Chirurgien de l'Hôpital Trousseau, Ancien Chirurgien en Chef de l'Hôpital Maritime de Berck, et Mme. Sorrel-Dejerine Ancien interne des Hôpitaux de Paris. In one volume. 25×32 cm. Pp. 514, with 640 illustrations. Paris: Masson et Cie, 120, Boulevard Saint-Germain. 1932. Price 350 francs. The work can also be obtained in two volumes, 380 francs. For admission to this country the postage for one volume is 30 francs, or for two volumes 45 francs.

have nothing but the highest praise for this handsome and effectively produced atlas-treatise: it is a unique work which every general and orthopædic surgeon as well as all tuberculosis officers dealing with cases of surgical tuberculosis in this country should procure and study.

MANUALS FOR MEDICAL ADVISERS AND WORKS OF REFERENCE.

The editors and publishers of *The Medical Annual* are to be specially congratulated on the completion of half a century of national service. Their unrivalled Year Book was started in 1883 and now we warmly welcome the jubilee issue.[1] For fifty years this unique publication has proved of the greatest assistance to the medical profession, and has truly justified its claim to be a Year Book of Treatment and Practitioner's Index. It was a happy inspiration to present with this year's volume a special supplement containing portraits of past and present contributors. *The Medical Annual* is an indispensable reference book for all doctors, and the issue for 1932, while arranged on the general and long approved plan, is of exceptional interest and value and contains authoritative communications from no less than thirty-eight well-known experts and leaders. There are extensive references to tuberculosis. An excellent summary of pulmonary tuberculosis is provided by Professor W. H. Wynn of Birmingham; surgical tuberculosis is dealt with by Professor E. W. Hey Groves and Mr. S. J. H. Griffiths of Bristol and Professor John Fraser of Edinburgh; while the surgical treatment of pulmonary tuberculosis is admirably surveyed by Mr. A. Tudor Edwards. Dr. Reginald Miller reviews recent literature relating to tuberculosis in children, and Dr. G. E. Oates treats of bovine tuberculosis in man. The volume contains a directory of sanatoria for consumption and other forms of tuberculosis. *The Medical Annual* is a reference work which should be in the possession of every qualified medical practitioner. While there still remain those who can testify personally to the incalculable value of the fifty volumes which are now available on many shelves, it may be hoped that among present subscribers there may be at least as many as will join in congratulations to editors and publishers on the appearance of a centenary volume.

The fine one-volume "Textbook of Medicine" edited by Dr. J. J. Conybeare, and first issued in 1928, has been so well received that a second edition has been speedily called for.[2] The purpose of the work has been appreciated—namely, to offer to senior students and practitioners the essentials of medicine in compact compass and at a reasonable price. Dr. Conybeare has been assisted in the production of this serviceable work by thirteen members of the staff of Guy's and other hospitals. The new edition has undergone thorough revision, four new contributors have participated, the additions and alterations

[1] The Medical Annual: A Year Book of Treatment and Practitioner's Index. Edited by Carey F. Coombs, M.D., F.R.C.P., and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S. The Fiftieth Issue and Jubilee Volume. Pp. xcx+676+151, with LXXXI. plates, 179 figures, and special supplement with 200 portraits. Bristol: John Wright and Sons, Ltd. 1932. Price 20s.

[2] "Textbook of Medicine." By Various Authors. Edited by J. J. Conybeare, M.C., M.D. Oxon., F.R.C.P., Assistant Physician to Guy's Hospital. Second edition. Pp. xix+1,004, with illustrations and X-ray plates. Edinburgh: E. and S. Livingstone, 16 and 17, Teviot Place. 1932. Price 21s.

have all been advantageous, some sections have been entirely rewritten, the number of figures and plates has been increased, and yet in spite of an increase in size the price has been slightly reduced. The general aspects of tuberculosis are dealt with by the editor and Dr. Geoffrey Marshall in an article placed with the infectious diseases. This is followed by a series of separate communications: Tuberculous Peritonitis by Dr. Trevor Owen; Laryngeal, Pulmonary, and Pleural Tuberculosis by Dr. Geoffrey Marshall; Renal Tuberculosis by Mr. Hugh Maclean; and Tuberculosis of the Skin by Dr. G. B. Dowling. The sections devoted to Tuberculosis of the Alimentary Tract and the Central Nervous System are somewhat brief. Several excellent plates illustrate this part of the volume. Dr Conybeare and his colleagues are to be congratulated on the success of their adventures. It is not an easy task to provide present-day students with an up-to-date, comprehensive, efficient manual of medicine which shall meet requirements for examinations and needs of practice, but Dr. Conybeare's volume provides admirably for the necessities of these situations. The volume is excellently got up, clearly printed on good paper, strongly bound, and furnished with a well arranged index. Other notable works on medicine have been given to us from Guy's: Dr. Conybeare's addition to the series is worthy to rank with the best.

Dr. Fine's compact handbook on diseases arising from the influence of filterable viruses meets a real want.[1] Little is known regarding filterable virus diseases, but such knowledge as is available as regards man is admirably presented in Dr. Fine's condensed and well-arranged summary. Essential facts are effectively set forth from pathological and clinical standpoints, and the diseases described are instructively grouped, so that some idea of existing relationships is indicated. At present any classification must be tentative. Dr. Fine's book also critically reviews the position as regards a number of diseases where differences of opinion exist among investigators. The work is one which should be studied by senior students and medical practitioners desiring to be up-to-date. At the end of each chapter is a serviceable bibliography, and in the appendices are presented in tabular form a summary of the chief features of human diseases believed to arise from infection with a filterable virus. The publishers have produced this indispensable manual in an attractive form and at a moderate price.

The English version of the monograph of the late Professor Sicard of Paris and Dr. J. Forestier of Aix-les-Bains on the medical use of iodized oil in the form of lipiodol for diagnosis and therapeutic purposes will be warmly welcomed, for it provides a clear and serviceable account of the present status of lipiododiagnosis and lipiodotherapy.[2] The authors in 1921 first pointed out the possibilities of the use of lipiodol as an opaque contrast medium in radiographic diagnosis, and since this date marvellous progress has been made in the elaboration of means whereby this new agent can be employed in the exploration

[1] "Filterable Virus Diseases in Man." By Joseph Fine, M.D., B.Sc., D.P.H., D.T.M., Assistant to the Professor of Public Health, Edinburgh University. Pp. 144. Edinburgh: E. and S. Livingstone, 16 and 17, Teviot Place. 1932. Price 6s.

[2] "The Use of Lipiodol in Diagnosis and Treatment: A Clinical and Radiological Survey." By J. A. Sicard, late Professor in the Faculty of Medicine, Paris, and Physician at the Necker Hospital, and J. Forestier, of Aix-les-Bains. Pp. ix+235, with 50 figs. and bibliography. London: Humphrey Milford, Oxford University Press, Amen House, Warwick Square, E.C. 4. 1932. Price 16s.

of different parts of the body, and especially intra-thoracic structures. The work before us is a comprehensive, up-to-date, lucidly-expressed vade-mecum which should appeal to all medical advisers. It opens with a description of the composition and properties of lipiodol and the technique of its employment, with general indications and contra-indications regarding its use. Readers of this journal will be specially interested in the section dealing with lipiodol and broncho-pulmonary cavities. In the investigation of bronchiectases the new method is often of great service, but in the study of cavities of tuberculous origin its scope is more restricted. It has been shown to be valuable in the carrying out of observations made on tuberculous cavities after thoracoplasty. The use of lipiodol has shown that not infrequently bronchiectatic and tuberculous cavities coexist in the same lung. It is shown that in some cases of supposed relapse when a patient is returned to a sanatorium with what is thought to be extension of the tuberculous trouble, the real cause for the setback is a development of bronchiectasis. Such cases manifestly must be treated for bronchiectasis and not for tuberculosis, since the pus comes from dilated bronchi and not from collapsed tuberculous cavities. The rôle of lipiodol as a therapeutic agent is still under consideration. It has been injected into a tuberculous pleura, pericardium and peritoneum, but the clinical data do not at present allow of any definite conclusion. It does not appear that lipiodol exercises any antiseptic action in tuberculous lesions. The volume is admirably produced as we always expect will be the case with an Oxford Medical Publication, well illustrated and provided with a very full bibliography.

Dr. Warren Vaughan's monograph on "Allergy and Applied Immunology" is a timely, reliable, comprehensive and serviceable critical summary of present-day knowledge regarding this new and promising speciality which now has societies, journals and books devoted to its scientific development. It will be welcomed both by laboratory technicians and clinicians.[1] The author expresses the hope that his book will enable medical advisers to investigate their own cases in accordance with modern methods of allergic study. He also provides detailed instruction regarding the desensitization treatment of allergy, with full information as to views seeking a satisfactory explanation of anaphylaxis. Dr. Vaughan holds that sensitization and the anaphylactic reaction are cellular rather than humoral phenomena. His volume is divided into several parts: Allergy, Allergens, Diagnosis, Prognosis, The Manifestations of Allergy and Applied Immunology. Although the subjects dealt with in this well-arranged work are difficult to understand and not easy to explain, Dr. Vaughan has succeeded in providing an exposition which is lucid, interesting and really informing and helpful, one which will appeal to the medical adviser and can be recommended to all thoughtful laymen desiring to understand the meaning of allergy and something of the principles and practice of applied immunology. There is a brief section on Tuberculosis Vaccines which we venture to quote: "The Calmette-Guerin vaccine is

[1] "Allergy and Applied Immunology: A Handbook for Physician and Patient on Asthma, Migraine, and Kindred Manifestations of Allergy." By Warren T. Vaughan, M.D., of Richmond, Virginia. Pp. 359, with tables, charts, maps, illustrations, and bibliography. London: Henry Kimpton, 263, High Holborn, W.C. 1931. Price 21s.

still in the experimental stage in the United States, although many thousands of children on the European continent have been vaccinated, apparently with great success. But it will require years—that is until these children have grown up—before we will be able to know definitely the degree of its efficacy. All attempts to immunize against the tubercle bacillus with dead micro-organisms have failed. These French investigators therefore inoculate with a strain of tubercle bacillus which has been grown on artificial culture media for fourteen years and which has been shown to have completely lost its ability to produce tuberculosis. It is fed by mouth to children of tuberculous parents within the first few days of life. The early administration is imperative, since it is known that the child of an actively tuberculous mother will become infected within a few days after birth. The child is also removed to a non-tuberculous environment." The volume, dedicated to the memory of the author's father, is handsomely produced, and although addressed primarily to American readers, should be of equal service in this country.

Mr. John Morley's monograph on abdominal pain is a work which deserves the thoughtful consideration of all members of the medical profession.[1] It is based on personal observations and carefully-devised clinical investigations, and the thesis regarding the origin of abdominal pain appears reasonable. Mr. Morley has clear conceptions regarding referred pain, and his researches would seem to indicate that Mackenzie's theory of an irritable focus in the cord and a viscero-sensory reflex will have to undergo modifications or be relinquished. Mr. Morley's work goes far to show that in the production of accurately localized abdominal pain with somatic manifestations of tenderness and rigidity only somatic nerves are concerned. In a series of excellently-arranged, lucidly-expressed, highly interesting chapters, Mr. Morley sets forth the problem of pain in regard to the various districts of the abdomen. Those interested in the study of abdominal tuberculosis will do well to consider the section dealing with tuberculous stricture occurring in the small intestine. Mr. Morley points out that these single or multiple strictures are commonly the result of annular tuberculous ulceration. Owing to the fluid nature of the intestinal contents no symptoms arise until a considerable degree of obstruction has occurred. Mr. Morley shows that the partial intestinal stenosis so produced makes itself felt by intermittent spasms of pain of the pure visceral type, and in course of time there occurs visible and palpable peristalsis of the hypertrophied bowel above this stricture and synchronizing with each spasm of pain. A stricture in the upper jejunum causes pain in the mid-sternum which may suggest duodenal ulcer. If the stenosis is in the lower part of the ileum, pain is felt a little above the umbilicus or sometimes in the region of the umbilicus. Mr. Morley says there is usually complete absence of tenderness or rigidity on palpation unless there are associated tuberculous glands in the mesentery, where some slight tenderness on deep pressure may be elicited. After studying Mr. Morley's illuminating work it may be

[1] "Abdominal Pain." By John Morley, Ch.M., F.R.C.S., Hon. Assistant Surgeon, Manchester Royal Infirmary. With an Introduction by J. S. B. Stopford, M.D., F.R.S., Professor of Anatomy, University of Manchester. Pp. xv + 191, with 22 illustrations. Edinburgh: E. and S. Livingstone, 16 and 17, Teviot Place. 1931. Price 10s 6d.

hoped that many will inquire further in regard to the problem of pain met with in cases of abdominal tuberculosis.

Major A. Corbett-Smith is the author of a number of brilliant war-books and other works dealing with travel, personalities, autobiographical experiences and social problems. His latest volume is a highly original study of Woman, the Eternal Idol.[1] It is mainly an exposition of the nobility of the art of love and an analysis of the rôle of the sex-impulse as a creative force, all ably expressed with literary grace and emotional power. With much wealth of illustration, keen insight and penetrating criticism the characteristics of woman are portrayed, particularly as manifest in these present times. The book, although in many parts heterodox according to current standards, is a frank, courageous, picturesque account of problems related to sex, and furnishes a striking plea for fuller knowledge regarding and a better understanding of the relationship between man and woman. Major Corbett-Smith's volume will occupy a notable place among modern studies on sexology and will doubtless provoke controversy and criticism. It is a work which should be read with discrimination, but it certainly deserves the unprejudiced study of members of the medical profession and all serious students striving for the betterment of mankind. As frontis-piece appears an illustration of Rodin's fine sculpture—"The Eternal Idol."

Dr. McBride's recently published book on sport is one which will be of special interest to all who realize the important rôle which games and sport occupy in our national life.[2] It is a revealing, suggestive, philosophical study which we particularly commend to medical advisers, and especially to all who have to deal in schools or elsewhere with boys and girls, adolescents and young men and women. Dr. McBride, since his own childhood, has been interested in sport and games, and now in his mature years has set forth in attractive form his conclusions regard-ing the philosophy, psychology and practical aspects of his subject. In a series of ten chapters Dr. McBride deals with the Growth and Decline of Sporting Tastes; The British Attitude Towards Sport; Health, Sport and Games; and Sportsmen in Relation to Animals; together with articles on Fishing, Shooting and Hunting. In the concluding chapter Dr. McBride summarizes essentials in regard to psychological processes associated with sports and games, dealing also with the question of mental relaxation and distraction both in the lives of the rich and those who work for a living. Dr. McBride's able work occupies a unique position in the literature of sport, and is one which should appeal to all thoughtful sport-loving Englishmen.

Great Britain is an ideal land for health and holiday resorts, and no medical adviser need be at a loss for guidance in regard to the selection of suitable centres for any cases requiring rest, recreation or climatic and spa treatment. Mr. S. E. Winbolt has provided attractive and informing handbooks on Kent, Somerset, Devon and Sussex in the admirable "Bell's Pocket Guides" series. The latest edition is a

[1] "Woman—Theme and Variations: A Divertisement." By A. Corbett-Smith. Pp. 332. London: Noel Douglas, 28, Little Ormond Street, W.C. 1. 1932. Price 8s. 6d.

[2] "The Philosophy of Sport." By P. McBride, M.D., F.R.C.P.E., F.R.S.E. Pp. ix + 190. London: Heath Cranton, Ltd., 6, Fleet Lane, E.C. 4. 1932. Price 7s. 6d.

welcome manual on the Chilterns and districts in the Thames Valley.[1] We warmly commend this charming little work to residents in London and the counties described, and all others who desire introduction to the delightful uplands of the chalky Chilterns and the peaceful beauties of the Thames. The book is full of interesting notes—antiquarian, historical, architectural and topographical—regarding the six regions so effectively described. Mr. Edgar Ward's beautiful photographic studies add greatly to the attractiveness of a particularly appealing volume.

Everyone now is interested in films and the service of our cinemas. This modern form of instruction and amusement has provided means for enjoyment and recreation among all classes of the community, and is rendering incalculable benefit to children and adult patients in hospitals, sanatoria and other institutions. It is very desirable that those responsible for the conduct of sanatoria, open air schools, tuberculosis settlements and the like should make themselves acquainted with practical matters relative to motion pictures. We therefore direct attention to Mr. Andrew Buchanan's excellent study of films and the development and management of the cinema.[2] It is a member of Pitman's serviceable "Art and Life" series of manuals, the general editor of which is Mr. Wright Watts Miller. Mr. Buchanan is an expert in cinema affairs, and has produced many films of every kind. His fascinating book provides a comprehensive survey of everything connected with film-making, and indicates the endless possibilities of the film as well as presenting necessary criticism regarding certain features connected with the science and art of film-production and present-day methods of presentation. Everyone interested in films and all who are thankful for the instructive and other benefits available through the properly conducted cinema should read Mr. Buchanan's revealing book. The fine illustrations add much to its interest and value.

"The Wayside Book" is one which will appeal to all lovers of the open-air life.[3] It is an ideal pocket companion for every class of wayfarer, and is a charming gift-book for convalescents and sanatoria patients as well as for all who can tramp and camp. This delightful little volume contains a collection of practical, informing, and uplifting essays, with recipes, notes on games for wet hours, amusing stories, and an inspiring liturgy.

[1] "The Chilterns and the Thames Valley." By S. E. Winbolt, with illustrations from photographs by Edgar Ward. Pp. xxxii + 289, with maps and 57 plates. London: G. Bell and Sons, Ltd., York House, Portugal Street, W.C. 2. 1932. Price 6s.

[2] "Films: The Way of the Cinema." By Andrew Buchanan Pp. xvi + 235, with 28 plates. London: Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, W.C. 2. 1932. Price 5s.

[3] "The Wayside Book." A Book for Ramblers, Campers, and all Wayfarers. Edited by Heather White and R. Francis Foster. With decorations by Margot Folliott. Pp. 158. London: C. Arthur Pearson, Ltd., Henrietta Street, W.C. 1932. Price 3s. 6d.

PREPARATIONS AND APPLIANCES.

HYGIENIC APPLIANCES AND THERAPEUTIC PREPARATIONS.

THE COLLIER FACE MASK, the essential features of which are indicated in the accompanying figure, will be of service in hospitals, sanatoria, and other institutions, as well as in general medical, nursing and midwifery services.[1] It consists of jaconet attached to a strip of flexible aluminium with tapes to be tied around the head. At the lower end is a light adjustable metal neck-spring. The mask can be washed and sterilized in a suitable germicidal solution. (The price is 1s.)

THE COLLIER FACE MASK.

THE "TOP-HAT" COOKER is an ingenious, effective, economical means for the carrying out of conservative, hygienic practical cookery.[2] With this appliance one can roast, boil, steam, bake or fry. It is so designed that a complete meal can be prepared over one flame. Such an equipment will be of service in many homes, and be of particular assistance to doctors, nurses and others who may want meals at irregular times. For the preparation of special meals for patients in their own homes this cooker will be of much advantage. The cooker is made of aluminium and is of British construction. (The price, according to size, is 10s. 6d., 15s. 6d. and 21s. 6d. each.)

THE TROJAN SPRING CAMP BED, the essential features of which are indicated in the adjacent figures, will be of service not only in connection with sanatoria, open-air schools and other institutions, but for

THE TROJAN SPRING CAMP BED.

children, invalids and others who can rest in their own gardens.[3] It will be appreciated by sound folk who by means of cars and other

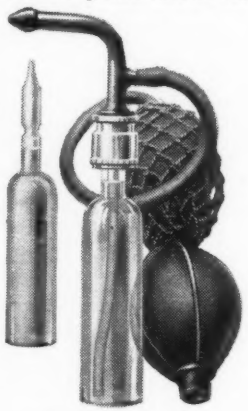
[1] The Collier Face Mask is supplied by Down Bros., Ltd., St. Thomas's St., S.E.

[2] The "Top-Hat" Cooker is supplied with a descriptive booklet by Mrs. Ada Dancy, 10, Duke's Avenue, Chiswick, W. 4.

[3] The Trojan Spring Camp Bed is manufactured by Trojan Limited, Vicarage Road, Croydon.

agencies or by simple hiking seek restoration or invigoration of health by living an open-air life. The Trojan can be seen in use at the children's sanatorium of the National Children's Home and Orphanage, Harpenden. This novel portable resting couch will be invaluable for campers, and provides inexpensive means for meeting the requirements of an unexpected guest. It is strong, compact, and is readily erected for use and folded for travel or storage. The strong, rot-proof canvas covering in white or green colouring ensures durability and allows for thorough cleansing. The Trojan is supplied in three sizes and weighs 13¼ pounds. (The prices range from 21s. to 27s. 6d.)

THE COLLOSOL SPRAY ADAPTER is an ingeniously devised, serviceable appliance for the application of tannic acid in the treatment of burns. It should have a place in sanatoria, hospitals, schools and other places where cases of burns may have to be dealt with promptly.[1] The chief features are indicated in the accompanying figure. By the immediate use of collosol and tannic acid of 2·5 per cent. strength supplied in stable solution and in interchangeable hermetically sealed ampoules, the pain of a burn is alleviated and shock minimized. This convenient equipment can easily be carried in a doctor's handbag. (The price of adapter with one ampoule is 7s. 6d; in metal case, 9s. Boxes of refills: 3, 3s.; 6, 5s.)



THE COLLOSOL SPRAY ADAPTER.

THE AVECTA DRAIN CLEANER only requires to be known and used to be appreciated.[2] It is a practical agent for dealing promptly, effectively and inexpensively with blocked drains. Made of strong spring steel, it is not only durable, reliable and effective, but can be readily

THE TERRY "AVECTA" DRAIN CLEANER.

[1] Full particulars regarding the Collosol Spray Adapter can be obtained from The Crookes Laboratories, British Colloids, Ltd., Park Royal, N.W. 10.

[2] The Avecta Drain Cleaner is manufactured by Herbert Terry and Sons, Ltd., Redditch.

operated. The chief features of this utilitarian appliance are indicated in the accompanying illustration. (The price complete with spring and brush is 10s. 6d.)

RIGBY'S "EASIWAY" GRASS SWEEPER should be found wherever there is a lawn to be kept tidy.[1] It will be useful in connection with the grounds of sanatoria and open-air schools where lawns have to be cared for by persons of limited physical powers or patients undergoing occupation-therapy. This new form of garden broom will be appreciated by those who have to keep lawns, greens, pitches, and the like in proper form. The essential features are indicated in the annexed figure. (The prices vary according to the width of sweeper, 8s. 9d. and 17s 6d. complete.)

THE EASIWAY GRASS SWEEPER.

THE "EASIHOE" is a garden tool which is an ingenious, simple, labour-saving, effective implement for weeding, singling, and general hoeing.[2] It consists of a spring metal fork mounted in a wooden handle, with a steel wire stretched between the points, and fitting into slots at the tips of the fork. This novel appliance will be appreciated by all gardeners and farmers, but it is to be specially commended to patients and delicate persons engaged in horticultural work. (Price according to length of handle, 2s. 9d. to 4s. 9d. Refills of steel-wire blades 1s. per half-dozen.)

THE "ECLIPSE" SAFETY RAZOR BLADES, made in Sheffield from high-grade crucible steel scientifically hardened and tempered, are provided with a keen, lasting cutting blade.[3] These essentials for a reliable and effective safety razor are the products of first-class workmanship. Doctors, patients, and all who use a serviceable safety razor will appreciate the "Eclipse" Blades. (The price is three for 1s.; five for 1s. 8d.)

The new FORD'S PATENT PEN provides a revolution in fountain pens. To doctors, nurses, and most other busy, up-to-date men and women a reliable pocket pen is an indispensable companion.[4] And particularly to those who have to live an open-air life this modern invention is a simple necessity. The new Ford is a novelty, scientifically designed and effectively constructed, which only needs to be used to be enthusiastically appreciated. It is a perfect, self-filling automatic safety-pen, so made that the screwing on of the cap closes a valve within the ink reservoir, so absolutely preventing any escape of ink,

[1] Rigby's Easiway Grass Sweeper is supplied by Rigby Battcock, Ltd., Mount Pleasant Works, Muston Road, Upper Clapton, E. 5.

[2] The "Easihoe" is supplied by the Easihoe Company (Proprietor A. S. Dance), New Street Farm, Andover, Hants.

[3] The "Eclipse" Safety Razor Blades are manufactured by James Neill and Co. (Sheffield), Ltd., Composite Steel Works, Napier Street, Sheffield.

[4] The Ford Patent Fountain Pen is of British manufacture, and is supplied by T. B. Ford, Ltd., 72, Piccadilly, W. 1.

and thus the pen, being sealed, can be carried with safety in any position. Moreover, by an ingenious arrangement the amount of ink is made visible. The quantity of ink which can be carried is considerably above that provided for in ordinary fountain pens. In the Ford pen there is no perishable rubber sac, but a transparent incorrodible reservoir made of non-inflammable odourless material. The filling of the pen is carried out by an ingenious, easy, and unique method. The chief features of the new pen—security, visibility, and capacity—are such as will insure its popularity. We particularly commend the new Ford to all medical readers of this JOURNAL. (The price is 30s.)

THE DANDEE DIBBER.

THE "DANDEE DIBBER" is a practical companion which every gardener should possess.[1] It is a handy metal tool, all in one piece, which facilitates seed-sowing, pricking out seedlings, and transplanting. It is particularly serviceable in weeding rockeries and clearing crazy pavement paths. This garden tool only needs to be used to be valued. (The price is 1s. 2d. post free.)

SOLIGNUM PRESERVATIVE AND STAINS are invaluable wherever wood is used for constructional purposes.[2] Solignum is of the greatest service in connection with sanatoria, open-air schools, and many other institutions, as well as for private dwellings. It is an excellent preservative both for indoor and outdoor use, and can be employed in a number of attractive shades. By its use the life of wood structures can be indefinitely prolonged.

TUBERCULIN TESTING according to the von Pirquet and Mantoux methods can be reliably and conveniently carried out by means of the special preparations provided by Messrs. Parke, Davis and Co.[3] The Mantoux diagnostic test consists of old tuberculin in one vial containing 0·01 c.c. of old tuberculin, with 10 c.c. of diluent in the second vial. When required for use, the whole diluent is added to the vial containing the 0·01 c.c. of tuberculin. For use this dilution, equivalent to 0·1 milligramme of tuberculin, is injected in the approved manner. The diluted tuberculin must be employed fresh. The tuberculin for the von Pirquet test is provided in capillary tubes, each containing sufficient for the conduct of one test. The tubes are supplied in cases fitted with three tubes of tuberculin and three tubes of control material. We commend these outfits to all workers with tuberculin as diagnostic agents.

[1] The "Dandee Dibber" is manufactured by the Horstmann Gear Company, Ltd., Newbridge Works, Bath.

[2] Full particulars regarding Solignum preparations can be obtained on application to Solignum, Ltd., 205, Borough High Street, S.E. 1.

[3] Full particulars regarding Tuberculin outfits can be obtained from Messrs. Parke, Davis and Company, Beak Street, Regent Street, W. 1.

THE OUTLOOK.

THE PROBLEM OF TUBERCULOSIS.

TUBERCULOSIS is still an unsolved problem, but steady progress is being made. This is made clear in the admirable general survey prepared by Dr. A. Salusbury MacNalty, and issued as publication No. 64 in the serviceable series of "Reports on Public Health and Medical Subjects."[1] The work is presented in nineteen chapters, covering a wide field, and furnishing a concise history of nearly twenty years of anti-tuberculosis activities. Sir George Newman, in his Prefatory Note, rightly claims that tuberculosis is not a disease solely of medical interest, but has a wide sociological and economic significance. He shows that anti-tuberculosis measures have become an integral part of the work of public authorities. The cost of maintaining residential institutions for the treatment of tuberculous cases alone amounts annually in England and Wales to some two and a half million pounds, exclusive of the cost of treating cases in public assistance hospitals. Dr. MacNalty has effectively reviewed the problem in all its complexity, dealing with the incidence and mortality of tuberculosis, the present position and existing views in regard to the disease, conditions and disease diminishing personal resistance to infection, and circumstances favouring infection. There follow sections regarding the action and influence of the State in the prevention and treatment of tuberculosis, measures constituting the essentials of a national tuberculosis scheme, and particulars regarding residential institutions and their rôle in the treatment of the disease. The report is of special value in providing a detailed survey of sanatorium treatment and its results. There is also an account of the village settlement and its place in a complete tuberculosis scheme, and sections on care and after-care, orthopædic schemes and the treatment of surgical tuberculosis, and special methods in the diagnosis and treatment of tuberculosis, tuberculosis in children, notification and the early diagnosis of tuberculosis, the examination of contacts, and the importance of research in tuberculosis. Such an enumeration of the chief contents of this able and comprehensive survey should be sufficient to indicate to tuberculosis officers and all medical advisers, and also laymen interested in the tuberculosis problem, the importance of this authoritative report. Dr. MacNalty closes his work with a chapter devoted to conclusions, which indicate how incomplete is our knowledge of tuberculosis, and how necessary is further research if a comprehensive and complete attack is to be effectively carried out. Here is Dr. MacNalty's last sentence: "It is only by co-ordinated progress along various paths, and by surveying the complex problem as a whole, that tuberculosis is likely to be combated successfully."

[1] "A Report on Tuberculosis, including an Examination of the Results of Sanatorium Treatment." By Arthur Salusbury MacNalty, M.A., M.D., F.R.C.P., Senior Medical Officer for Tuberculosis, Ministry of Health. Pp. viii + 172, with tables and diagrams. London: H.M. Stationery Office. 1932. Price 3s.

BOVINE TUBERCULOSIS.

The question of bovine tuberculosis is now to receive more attention. At the forthcoming centenary meeting of the British Medical Association the Tuberculosis Section on July 28 is to discuss the Rôle of the Bovine Tubercle Bacillus in Human Tuberculosis. Among recent studies dealing with bovine tuberculosis, the report issued by the People's League of Health merits special consideration.[1] It contains the reports of three sub-committees and the conclusions of the general committee. The essential conclusions of the first report may be summarized as follow: (*a*) It is estimated, on the basis of the tuberculin reaction, that at least 40 per cent. of the cows in this country are infected with the tubercle bacillus, though only a minority of them are in an actively infective condition. (*b*) About 0·2 per cent. of all cows (or 1 in 500) are suffering from tuberculosis of the udder, and are therefore probably excreting living tubercle bacilli in the milk. (*c*) About 40 per cent. of cows slaughtered in the public abbatoirs show naked-eye lesions of tuberculosis. (*d*) A proportion of the raw market milk, varying in different parts of the country from 2 to 13 per cent., or having an average figure of 6·7 per cent., contains living tubercle bacilli. (*e*) In England and Wales about 6 per cent. of all deaths from tuberculosis are caused by the bovine type of bacillus. (*f*) About 2,000 deaths in England and Wales, mostly in children, occur annually from this cause. (*g*) At least 4,000 fresh cases of bovine infection develop each year, an immense amount of suffering, invalidity, and often permanent deformity being thus caused by this bacillus. The committee places in the forefront that the essential object to be aimed at is a diminution and ultimate elimination of tuberculosis amongst our dairy-herds, so that cows entirely free from tuberculosis should be the sole source of milk and milk-products for human consumption. There is also a statement on "The Influence of Nutrition upon the Liability to Infection," by Sir Frederick Gowland Hopkins. The most essential conclusions presented in this suggestive and enlightening publication are as follow: Broadly summarized, the opinion of the committee is that the only classes of milk which can be considered safe from the risk of conveying tuberculosis are—(*a*) milk obtained from herds certified under adequate control to be free from tuberculosis, and (*b*) milk which has been subjected to efficient and controlled pasteurization, or other approved process of heat-treatment. The former is represented by herds licensed either as "Certified" or as "Grade A (Tuberculin Tested)," and the committee favours steps to facilitate the extension of the number of such herds. "The efficient pasteurization of the rest of the milk supply is beset with many technical and trade difficulties, and immediate steps to put into operation a universal scheme are not practicable. While emphasizing the principle, the committee recommends as a first step, and as something feasible with but little delay, that, subject to a preliminary inquiry by the Ministry of Health, legal steps be taken to give permissive powers to the larger urban areas to require the efficient pasteurization (or other accepted form of heat-treatment) of all milk sold within their areas which is not drawn from

[1] "Report of a Special Committee appointed by the People's League of Health, Inc., to make a Survey of Tuberculosis of Bovine Origin in Great Britain." Pp. xvii+44. London: The People's League of Health, 12, Stratford Place, W. 1. 1932. Price 1s. 6d.

tuberculosis-free cows. This procedure has the advantage that it can be extended without much difficulty as shown to be advisable and practicable. The provision for the major part of the population of a milk-supply safe from the risk of containing tubercle bacilli, and, for the most part, safe from the risk of conveying other infectious diseases, will, it is anticipated, not only remove many of the dangers connected with the milk-supply, but enable milk to take its rightful place as a safe and valuable food."

NOTES AND RECORDS.

By the passing of Dr. Marcus Paterson in his sixty-second year on June 1, this country has lost a notable pioneer in the construction and management of institutions for the tuberculous and the organization of a system of treatment based on new views regarding auto-inoculation. His chief published work was a monograph on "Auto-inoculation in Pulmonary Tuberculosis." Memoirs appeared in the *Lancet* for June 11 and the *British Medical Journal* for June 18.

The Italian Fascist National Federation against Tuberculosis has placed at the disposal of the International Union against Tuberculosis two scholarships at the Benito Mussolini Institute in Rome. These competitive scholarships, each of the value of 6,000 lire plus board and lodging, are intended to enable foreign medical practitioners to stay at the Institute for the purpose of following a course of studies during an academic year of eight months: November 15 to July 15. They will preferably be awarded to young physicians who are already familiar with tuberculosis problems. The kind of work undertaken will be subject to an agreement between the director of the Institute and the candidate. The scholarships will be awarded at the meeting of the executive committee of the International Union in September next. The names of candidates, accompanied by particulars of their age, qualifications, and professional experience, must be forwarded to the secretariat of the Union not later than July 15. No candidature will be taken into consideration unless it has been forwarded by a Government or association belonging to the International Union; and applications from Great Britain and Northern Ireland should reach the secretary of the National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, London, W.C. 1, before July 10.

The 18th Annual Conference for the Prevention of Tuberculosis will be held, July 21-23, in the Great Hall of University College, Gordon Street, W.C. 1. Sir Edward Hilton Young, Minister of Health, will open the conference. As the conference coincides with the jubilee of the discovery of the tubercle bacillus by Robert Koch, there will be addresses on the influence of the discovery on medicine by Dr. R A. Young, on surgery by Sir Henry Gauvain, and on public health by Dr. William Charles White of America. A discussion on "The Protection from Tuberculosis of the Young Adult" will be opened by Dr. F. J. H. Coutts, and on "The Need for Continuity of Care in Tuberculosis" by Miss Edith McGaw and Dr. R. Septimus Walker. There will be visits to Queen Mary's Hospital for Children at Carshalton and elsewhere. Further particulars can be obtained from the

Secretary, National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, W.C. 1.

The Tuberculosis Section of the centenary meeting of the British Medical Association will meet on the mornings of July 27 and 28, under the presidency of Sir Robert W. Philip, when discussions will take place on "The Position of Tuberculin Today" and "The Rôle of the Bovine Tubercle Bacillus in Human Tuberculosis."

The 6th World Conference of the New Education Fellowship will be held at Nice, July 29 to August 12. The general subject for consideration will be "Education and Changing Society." The minimum cost from London will be £15, based on existing exchange rates. Further particulars may be obtained from the Conference Secretary, New Education Fellowship, 11, Tavistock Square, W.C. 1.

The hundred and first annual meeting of the British Association for the Advancement of Science will be held this year at York, August 31 to September 7 inclusive, under the presidency of Sir J. Alfred Ewing.

The Sun Bathing Society will hold a summer conference at Harrogate, August 6-27. Particulars from the Honorary Secretary, Sun Lodge, Upper Norwood, S.E. 19.

The New Health Summer School is to be held at Matlock, August 27 to September 10. Particulars can be obtained from the General Secretary, New Health Society, 39, Bedford Square, W.C. 1.

The Papworth Village Settlement, Cambridge, has received from the trustees of the late Mr. Bernhard Baron a gift of £20,000 towards the cost of a new hospital at Papworth. This, coupled with a donation of £2,500 from the Joint Finance Committee of the British Red Cross Society, will enable the much-needed new building to be erected without delay.

The governors of the City of London Hospital for Diseases of the Heart and Lungs have sold Saunderton Sanatorium, near High Wycombe, to the Bucks County Council, for use as an isolation hospital.

The Joint Tuberculosis Council, the Hon. Secretary of which is Dr. Ernest Ward, Torquay Road, Paignton, Devon, has issued a "Report of Proceedings for 1930-31," containing particulars of the Transatlantic Scholarship Tour, a report on Care and After-care Schemes, and evidence relating to tuberculosis in children, together with a list of members of the Council. The Joint Council has also issued an important report on "Improvements in the Tuberculosis Service."

The City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E. 2, has issued a 1931 "Report of the Pathological Laboratories," of which Dr. S. Roodhouse Gloyne is Director. This contains interesting statistical records, and reprints of papers published by members of the staff.

The Anglo-American Oil Company, Ltd., 36, Queen Anne's Gate, Westminster, S.W. 1, has favoured us with a set of their "Pratts High-Test Plans of the Road." These graphic pictorial guides are unique, showing the principal roads of the country with chief places thereon, and dainty little pictures of historic and other centres The series includes the Great North Road, the Bath Road, and Watling Street; also roads leading to the South Coast and the chief districts in the West Country and New Forest. There is also a fine map of Scotland. These novel maps will appeal specially to motorists, but will

interest all sorts and conditions of men, women, and children: and for display in sanatoria, open-air schools, and educational centres they are to be warmly commended.

The London Teachers' Association, Ludgate House, 110, Fleet Street, E.C. 4, has issued a 1932 edition of the "L.T.A. Register of Recommended Hotels, Boarding Houses, and Apartments" (price 1s.). This will be of much service to many seeking guidance with regard to health and holiday centres at home and abroad.

The "Kuklos Annual" is now in its ninth year, and while primarily addressed to the cyclist is a work which should be known to all travellers desiring guidance in regard to health and holiday plans.[1] There is a serviceable resthouse directory.

Lovers of gardens should secure a copy of the finely illustrated guide to the famous private gardens of this country which will be open this season to the public.[2] The lists, extending over 47 pages, give name, address, owner, and dates when each garden can be visited.

Architecture Illustrated, published monthly from 44, Doughty Street, W.C. 1 (price 1s. each number), is an artistic and finely illustrated journal, giving pictorial illustrations and reproductions of plans of new buildings in various parts of the country.

The press service of the Soviet Union Year Book, 58-60, Moorgate, London, E.C. 2, has sent us the following communication relating to tuberculosis work in Russia: In order to combat the widespread tuberculosis increasing research work is being carried out in the U.S.S.R. There are now twelve medical institutes in the R.S.F.S.R. alone, and nineteen institutes in the whole of the U.S.S.R. specializing in research in regard to tuberculosis. The number of patients treated for tuberculosis in hospitals and sanatoria was 28,000 in the R.S.F.S.R. alone. Progress made in the treatment of tuberculosis may be gauged from the fact that in Moscow the number of deaths from tuberculosis of the lungs in 1931 was 12·6 per 10,000 patients, and compared to 22·6 per 10,000 patients in 1913, a decline of 45 per cent. in deaths from tuberculosis.

The American National Tuberculosis Association, by the monthly issue of *Tuberculosis Abstracts: A Review for Physicians*, is rendering a world-wide service. We would direct special attention to the June number, presenting a striking communication by Dr. Allen K. Krause on "The Genius of Koch."

The British Hanovia Quartz Light Company, Ltd., Slough, have issued a new illustrated booklet, "Hanovia Equipment for Light Therapy," giving particulars regarding their standard clinical models. A copy may be obtained on application.

An account of the position (up to midsummer, 1931) of the campaign in Germany against tuberculosis has recently been published in Berlin in connection with the 35th General Congress of the German Anti-Tuberculosis Central Committee, held at Bad Kissingen on May 28,

[1] "The Kuklos Annual and Handbook for Cyclists and all Wayfarers." Edited by Fitzwater Wray. London: Ed. J. Burrow and Co., Ltd., Wellington House, Strand, W.C. 1932. Price 1s.

[2] "The Gardens of England and Wales" Open to the Public in Aid of the Queen's Institute of District Nursing, classified by dates and alphabetically. Introduction by Christopher Hussey. Pp. 136, 31 being full-page plates. Published for the Queen's Institute of District Nursing, 58, Victoria Street, S.W. 1, by *Country Life*, Ltd., 20, Tavistock Street, W.C. 2. 1932. Price 1s.

1931.[1] The author, Dr. F. Helm, after surveying broadly the position in 1930 and summarizing various institutional activities (including anti-lupus measures), considers the year's work in Germany in detail, province by province. By using large maps and diagrams, he clearly demonstrates the distribution and organization of different types of institutions for the care or treatment of the tuberculous. The whole work (which is in imperial quarto) is rounded off with a lengthy appendix relating to State and municipal participation, to public health measures, and to the organization and activities of the German Central Committee, as applied to combating this widespread disease.

A new and eleventh edition of the valuable Handbook of the Nurses' League of Guy's Hospital and Register of Members of the Nurses' League trained at the Hospital has recently been issued.[2] In addition to the Directory section, there are articles dealing with nursing matters, and likely to be of service to those desiring to take up nursing as a profession. There are dietary tables and other information, including a collection of recipes for the sick-room, which nurses will find useful.

Twenty-five years ago the first English open-air school was established. *The Times Educational Supplement* for June 25 contains an informing survey under the title of "English Open-Air Schools."

[1] "Der Stand der Tuberkulose-Bekämpfung im Frühjahr, 1931" [The Status of Tuberculosis Control in the Spring of 1931]. By Dr. F. Helm. Published by the German Central Committee for Combating Tuberculosis, Königin-Augusta Strasse 7. Pp. 136. Berlin W. 9. 1932. Price $1.00.

[2] "Guy's Hospital Nursing Guide." Edited by the Matron. Eleventh edition. Pp. xv+227. London: Ash and Co., Ltd., Henry Street, Bermondsey, S.E. 1. 1932. Price 3s.